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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

First Named Inventor : Haines et al.	Appeal No.
Appln. No.: 09/894,821	
Filed : June 28, 2001	Group Art Unit: 2188
For : SEQUENTIAL VECTORED BUFFER MANAGEMENT	Examiner: Gary J. Portka
Docket No.: S01.12-0711/STL 9608	

**TRANSMITTAL OF APPEAL BRIEF  
(PATENT APPLICATION - 37 C.F.R. § 192)**

Mail Stop Appeal Brief - Patents  
Commissioner for Patents  
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20<sup>th</sup> DAY OF SEPTEMBER, 2004

Allego  
PATENT ATTORNEY

Sir:

Transmitted herewith is the Appeal Brief in this  
application with respect to the Notice of Appeal filed on July 20,  
2004.

FEE FOR FILING APPEAL BRIEF

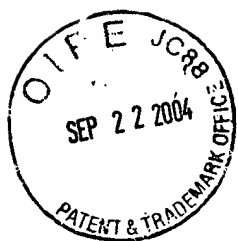
Pursuant to 37 C.F.R. 1.17(c) the fee for filing the  
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The Director is authorized to charge any additional fees  
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Respectfully submitted,  
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## BEST AVAILABLE COPY

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## BRIEF FOR APPELLANT

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20<sup>th</sup> DAY OF SEPTEMBER 2004  
*A. Lego*  
PATENT ATTORNEY

Sir:

This is an appeal from an Office Action dated April 20, 2004 in which claims 1-2, 9-10 and 20 were finally rejected and claims 3-8 and 11-19 were objected to.

### REAL PARTY IN INTEREST

Seagate Technology LLC, a corporation organized under the laws of the state of Delaware, and having offices at 920 Disc Drive, Scotts Valley, California 95066, has acquired the entire right, title and interest in and to the invention, the application, and any and all patents to be obtained therefor, as set forth in the Assignment filed with the patent application and recorded on Reel 012663, Frame 0538.

### RELATED APPEALS AND INTERFERENCES

There are no known related appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

### STATUS OF THE CLAIMS

I. Total number of claims in the application.

Claims in the application are: 1-20

II. Status of all the claims.

A. Claims cancelled: ---

B. Claims withdrawn but not cancelled: ---

C. Claims pending: 1-20

D. Claims objected to but allowable: 3-8 and 11-19

E. Claims rejected: 1-2, 9-10  
and 20.

III. Claims on appeal

The claims on appeal are: 1-2, 9-10  
and 20.

#### STATUS OF AMENDMENTS

No amendments were filed subsequent to the final rejection.

#### SUMMARY OF INVENTION

In general, the present invention relates to a memory management system having at least one data storage medium and a buffer memory (such as a disc drive, for example).

In traversing a buffer memory, a traversal engine has traditionally functioned such that each access of a subsequent buffer or cache address was treated as a completely new and independent access to the cache. Therefore, even in situations where the traversal engine was to traverse three sequential buffer memory addresses, the traversal engine would release ownership of the buffer and re-arbitrate for access to each subsequent (or "next") buffer address location. This adds significant delay in the command overhead. (Page 3, lines 4-11.)

The present invention addresses the above-noted problems with the prior art. One embodiment of the present invention relates to a memory management system 200 (FIGS. 2 and 3) that includes an arbitrated buffer memory 212 having a plurality of memory address locations storing data associated with addresses of a data storage medium 106 (FIG. 1). The system

200 also includes a traversal component 220 configured to receive a requested traversal, arbitrate ownership of the memory 212 and to traverse sequentially mapped entries in the memory 212, associated with the requested traversal, prior to de-arbitrating itself from ownership of the memory 212. (Page 16, line 24 - page 17, line 6.)

DESCRIPTION OF REFERENCES RELIED ON BY THE EXAMINER

Krantz et al., U.S. Patent No. 6,530,000 B1, hereinafter "Krantz" (See Appendix B), relates in general, to a method of providing access to a buffer memory of a hard disk controller. (Col. 1, lines 11-12.) More specifically, Krantz provides a method in which each one of several units or circuits (such as a controller microprocessor, a host interface unit, a disk formatter unit, etc.), within the controller, accesses the buffer memory to store or retrieve information. For example, in one embodiment disclosed in Krantz, the system operates in a cycle during which each unit is offered continuous access duration. The disk formatter, having the most critical access requirements, is offered period access such that the time delay during which it does not have access does not exceed a specified period. (Col. 1, line 63 - col. 2, line 19.)

Berning et al., U.S. Patent No. 6,038,619, hereinafter "Berning" (See Appendix B), relates to the identification and handling of consecutive read or write requests imposed on a disk drive. (Col 3., lines 8-9). "Consecutive" read or write requests disclosed in Berning are defined as "pure" or "near" sequential. (Col. 3, line 11). To determine that, logical block addresses (LBAs), which are an addressing scheme used to access locations on the disk 11 in Berning, are compared between current and immediate predecessor requests. (Col. 3, lines 30-31).

Tamura, U.S. Patent No. 6,389,508 (See Appendix B), relates to an information storing apparatus such as a magnetic disk drive or the like for writing data transferred by a write



command from a host onto a medium. (Col. 1, lines 5-8).

ISSUES

Whether claims 1-2, 9 and 20 are non-obvious in view of Krantz and Berning.

Whether claims 10 is non-obvious in view of Krantz, Berning and Tamura.

GROUPING OF CLAIMS

The following groupings of claims are made solely in the interest of consolidating issues and expediting this Appeal. No grouping of claims is intended to be nor should be interpreted as being any form of admission or a statement as to the scope or obviousness of any limitation.

Group I: Claims 1-2 and 9-10;

Group II: Claim 20.

ARGUMENT

I. Rejection of Group I claims

In section 3 of the final Office Action, claims 1-2 and 9 were rejected under 35 U.S.C. §103(a) as being unpatentable over Krantz in view of Berning. Further, claim 10 was rejected under 35 U.S.C. §103(a) as being unpatentable over Krantz in view of Berning and further in view of Tamura.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all of the claim limitations. In re Vaeck, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991); M.P.E.P. §2143.

Under these criteria, the final Office Action fails to establish a *prima facie* case of obviousness of claims 1-2 and 9-10 based on the cited prior art.

#### A. Argument for claims 1 and 2

Claim 1 includes an arbitrated buffer memory and a traversal component configured to traverse sequentially mapped entries in the memory. As correctly pointed out in the final Office Action, Krantz does not disclose a traversal component configured to traverse sequentially mapped entries in an arbitrated buffer memory. In fact, Krantz makes no suggestion of that feature. As a result, the final Office Action relies on Berning. (Citing Abstract, col. 2 lines 64-67, and col. 3, lines 8-24 and 25-40.)

The final Office Action states, with respect to Berning, that the "teaching of allowing the traversal of sequential entries unabated as applied to Krantz is clearly equal to the recited traversal of entries prior to de-arbitrating." This statement is incorrect.

Berning discloses a data buffer 7 that is distinct from the disk 11 (see FIG. 1). "Consecutive" read and write requests disclosed in that reference are defined as "pure" or "near" sequential (col. 3, line 11). To determine that, logical block addresses (LBAs) are compared between current and immediate predecessor requests. One skilled in the art understands that LBAs is an addressing scheme used to access the disk 11 (see col. 2, lines 55-61). In fact, each discussion of sequential logical addresses is associated with features of the disk, such as "(cylinder, track, and head)" in col. 2, lines 55-61, and "a cyclic, concentric, multitrack disk or a cyclic, spiraltrack disk," in col. 3, lines 28-37. Thus, Berning deals with consecutive requests to the disk 11, not to data buffer 7. In addition, Berning does not teach or suggest traversing sequentially mapped entries in a buffer memory prior to de-arbitrating ownership of the buffer memory, as recited in claim 1.

The buffer memory is a different element than the recited data storage medium in claim 1. Since neither reference

teaches nor suggests a traversal component configured to traverse sequentially mapped entries in an arbitrated buffer memory, the Examiner has failed to support a *prima facie* conclusion of obviousness (by not satisfying the third criterion for a *prima facie* conclusion of obviousness set forth in Vaeck) with regard to claim 1. Therefore, claim 1 is allowable. Claim 2 is also allowable due to its dependence on allowable claim 1.

In response to the Appellants' arguments to a previous Office Action, the final Office Action states "Berning describes requests for sequential entries in the device, and the description that this data is 'streamed' through the buffer necessarily includes that sequential data is consecutively accessed in the buffer." The phrase "necessarily includes that sequential data is consecutively accessed in the buffer" is entirely conclusory and, in reality, is nothing more but an inherency argument.

Section 2112 of the Manual of Patent Examination and Procedure (MPEP) states that:

"In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990).

Appellants respectfully submit that, without providing the necessary support required in accordance with the above MPEP section, the Examiner has not met the burden required to support the rejection of claim 1 under 35 U.S.C. §103(a).

The final Office Action cites to no reference to support the conclusion "necessarily includes that sequential data is consecutively accessed in the buffer." No evidence of record exists that shows one skilled in the art would recognize such. No logical reasoning is provided, based on objective evidence, that supports this conclusion. The final Office Action simply provides

nothing to show that traversing "sequentially mapped entries in the memory, associated with the requested traversal, prior to de-arbitrating itself from ownership of the memory" is inherent in Berning or known to one skilled in the art.

As mentioned above, traditional traversal engines have functioned such that even in situations where the traversal engine was to traverse sequential buffer memory addresses, the traversal engine would release ownership of the buffer and re-arbitrate for access to each subsequent (or "next") buffer address location. To overcome these problems, claim 1 includes a traversal component configured to receive a requested traversal, arbitrate ownership of the memory and to traverse sequentially mapped entries in the memory, associated with the requested traversal, prior to de-arbitrating itself from ownership of the memory. This is clearly not inherent in the teachings of Berning.

Thus, the Examiner's apparent conclusion of inherency is not correct and not supported by the reference. However, even if the Examiner's conclusion of inherency were correct, it would have no legal support on which to base an obviousness type rejection. "That which may be inherent is not necessarily known. Obviousness cannot be predicated on what is unknown." In re Spormann, 363 F.2d 444, 448, 150 USPQ 449, 452 (CCPA 1966) (emphasis added). For the above reasons, a *prima facie* case of obviousness for claim 1 has not been made. Thus, claim 1 is allowable.

#### **B. Argument for claim 9**

Claim 9 features traversing all sequential entries in the data buffer. Krantz teaches or suggests nothing about accessing entries in the data buffer. Similarly, Berning teaches or suggests nothing about traversing all sequential entries in the data buffer. Therefore, claim 9 is not obvious and is allowable.

#### **C. Argument for claim 10**

As mentioned above, claim 10 (which depends from claim

9) was rejected under 35 U.S.C. §103(a) as being unpatentable over Krantz in view of Berning and further in view of Tamura. As explained above, claim 9 is not obvious in view of Krantz and Berning. Tamura does not overcome the deficiencies of those references. As such, claim 10 is also not obvious over those references due to its dependence on allowable claim 9.

II. Rejection of Group II claim 20

Claim 20 was rejected under 35 U.S.C. §103(a) as being unpatentable over Krantz in view of Berning.

Claim 20 is written-in "means-plus-function" form and includes "means for buffering data written to and read from the data storage medium by utilizing sequentially mapped buffer data, associated with a requested traversal, to decrease time associated with buffering." In examining a means-plus-function claim, the Supplemental Examination Guidelines for Determining the Applicability of 35 U.S.C. § 112, Paragraph 6, which were set forth in the Federal Register on June 21, 2000 (Vol. 65, No. 120) apply. (See also In re Donaldson Co., 29 U.S.P.Q.2d 1845 (Fed. Cir. 1994) and IMS Technology, Inc. v. Haas Automation, Inc., 54 U.S.P.Q.2d 1129 (Fed. Cir. 2000)). Section II, paragraph 2 of the Guidelines, states "If a claim limitation invokes 35 U.S.C. § 112, para 6, it must be interpreted to cover the corresponding structure, material or acts in the specification and 'equivalents thereof.'"

In the present case, independent claim 20 recites means for buffering data written to and read from the data storage medium by utilizing sequentially mapped buffer data, associated with a requested traversal, to decrease time associated with buffering. Thus, according to the Guidelines, the structure (i.e., means for buffering data written to and read from the data storage medium by utilizing sequentially mapped buffer data, associated with a requested traversal, to decrease time associated with buffering) shall be construed as disclosed in

Appellants' Specification. The corresponding structure can be found at FIG. 2 (for example) and includes an arbitrated buffer memory 212 and a traversal component 220 configured to receive a requested traversal, arbitrate ownership of the memory 212 and to traverse sequentially mapped entries in the memory 212, associated with the requested traversal, prior to de-arbitrating itself from ownership of the memory 212.

As mentioned above, Krantz teaches or suggests nothing about accessing entries in the data buffer. Further, as noted above, Berning teaches or suggested nothing about traversing all sequential entries in the data buffer. Therefore, a properly interpreted means-plus-function claim 16 is non-obvious over the cited prior art.

CONCLUSION

For the reasons discussed above, Appellants respectfully submit that claims 1-2, 9-10 and 20 are neither taught nor suggested by the references cited by the Examiner. Thus, Appellants respectfully request that the Board reverse the Examiner and find all pending claims allowable.

Respectfully submitted,

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Appendix A

1. A memory management system having at least one data storage medium, the memory management system comprising:  
an arbitrated buffer memory having a plurality of memory address locations storing data associated with addresses of the data storage medium; and  
a traversal component configured to receive a requested traversal, arbitrate ownership of the memory and to traverse sequentially mapped entries in the memory, associated with the requested traversal, prior to de-arbitrating itself from ownership of the memory.
2. The memory management system of claim 1 wherein the traversal component comprises:  
a memory accessing component sequentially accessing entries in the memory based on the requested traversal and storing the entries in an accessing memory.
3. (Pending but not on appeal) The memory management system of claim 2 wherein the traversal component comprises:  
a traversal engine configured to access the entries in the accessing memory and determine whether the entries in the accessing memory correspond to memory entries corresponding to the requested traversal.
4. (Pending but not on appeal) The memory management system of claim 3 wherein the memory comprises a linked list of memory locations.
5. (Pending but not on appeal) The memory management system of claim 4 wherein the requested traversal includes a memory

starting address and a number of hops to take through the linked list beginning at the memory starting address.

6.(Pending but not on appeal) The memory management system of claim 5 wherein the traversal engine is configured to determine whether the entries in the accessing memory correspond to memory entries corresponding to the requested traversal by determining whether the entries in the accessing memory correspond to memory locations in the linked list identified by the requested traversal.

7.(Pending but not on appeal) The memory management system of claim 6 wherein the memory accessing component and the traversal engine are configured to operate substantially in parallel.

8.(Pending but not on appeal) The memory management system of claim 7 wherein the traversal component is configured to voluntarily relinquish ownership of the memory after traversing sequentially mapped entries in the memory and to re-arbitrate for ownership of the memory and continuing traversal of the memory until the requested traversal is complete.

9. A method of managing a data buffer, the method comprising:  
    (a) receiving a traversal request to traverse the data buffer;  
    (b) arbitrating for ownership of the data buffer; and  
    (c) traversing all sequential entries in the data buffer, beginning at an entry point in the data buffer, corresponding to the traversal request prior to voluntarily relinquishing ownership of the data buffer.

10. The method of claim 9 wherein receiving operation (a) comprises:



- (a) (1) receiving a data buffer starting address; and
- (a) (2) receiving a number of memory locations in the data buffer which must be made to complete the traversal request.

11. (Pending but not on appeal)      The method of claim 10 wherein the data buffer comprises a linked list and wherein the traversing operation (c) comprises:

- (c) (1) reading adjacent entries in the data buffer into a register; and
- (c) (2) determining whether the entries in the register correspond to the traversal request.

12. (Pending but not on appeal)      The method of claim 11 wherein the traversing operation (c) further comprises:

- performing the reading operation (c) (1) and the determining operation (c) (2) substantially in parallel.

13. (Pending but not on appeal)      The method of claim 12 wherein the traversing operation (c) further comprises:

- (c) (3) reducing the number of memory locations from the receiving operation (a) (2) by one each time the determining operation (c) (2) determines that an entry in the register corresponds to the traversal request.

14. (Pending but not on appeal)      The method of claim 13 and further comprising:

- (d) voluntarily relinquishing ownership of the data buffer after all sequential entries in the data buffer, corresponding to the traversal request, are read into the register.

15. (Pending but not on appeal)      The method of claim 13 and

further comprising:

- (e) stopping the reading operation (c)(1) when it is determined in determining operation (c)(2) that an entry in the register does not correspond to the traversal request; and
- (f) voluntarily relinquishing ownership of the data buffer.

16. (Pending but not on appeal) The method of claim 15 and further comprising:

- (g) after ownership of the data buffer has been relinquished, determining whether the number of memory locations from the receiving operation (a)(2) has been reduced to zero.

17. (Pending but not on appeal) The method of claim 16 and further comprising:

- (h) if in step (g) it is determined that the number of memory locations from the receiving operation (a)(2) has not been reduced to zero, re-arbitrating for ownership of the data buffer.

18. (Pending but not on appeal) The method of claim 17 and further comprising:

- (i) continuing the traversing operation (c) until the number of memory locations to complete the traversal request is reduced to zero.

19. (Pending but not on appeal) The method of claim 18 wherein the continuing operation (i) comprises:

- (i)(1) beginning traversing the data buffer at an entry point at a next data buffer location in the linked list corresponding to the traversal request.

20. A data storage device, comprising:  
a data storage medium; and  
means for buffering data written to and read from the data  
storage medium by utilizing sequentially mapped buffer  
data, associated with a requested traversal, to  
decrease time associated with buffering.

Appendix B

Krantz et al., U.S. Patent No. 6,530,000, March 2003

Berning et al., U.S. Patent No. 6,038,619, March 2000

Tamura, U.S. Patent No. 6,389,508, May 2002

Appendix C

In re Vaeck, 20 U.S.P.Q.2d 1438 (Fed. Cir. 1991).

In re Donaldson Co., 29 U.S.P.Q.2d 1845 (Fed. Cir. 1994).

IMS Technology, Inc. v. Haas Automation, Inc., 54 U.S.P.Q.2d 1129 (Fed. Cir. 2000).

Ex parte Levy, 17 U.S.P.Q.2d 1461, 1464 (Bd. Pat. App. & Inter. 1990).

In re Spormann, 363 F.2d 444, 448, 150 U.S.P.Q. 449, 452 (CCPA 1966).

products so that they can be positioned to enter the general market at the end of the lives of relevant patents. At least for relatively small start-up companies like Ventritex, where much of the business and technical work essential to survival is done by a small group of people, the promise by Congress of a safe haven could prove to be completely illusory if the courts permitted competitors to proceed full bore with expensive, resource-draining, and personnel-distracting litigation in the form of actions for declaratory relief. It makes little sense, and thus we assume would be inconsistent with Congress' intent, to protect companies like Ventritex from suit for actual patent infringement but leave them fully exposed to declaratory relief actions whose gravamen and burdens are much the same. While the considerations discussed in the preceding paragraph are sufficient to support our decision not to exercise jurisdiction at this time over plaintiff's declaratory relief counts, the fact that these additional policy considerations cut in the same direction intensifies our resolve.

For all the reasons discussed in this section, we hereby GRANT defendants' motion to dismiss plaintiff's declaratory relief claims (Counts VIII and IX). Those counts are ORDERED dismissed.

#### V. DEFENDANTS' MOTION TO DISMISS THE REMAINING STATE LAW CLAIMS (COUNTS X - XIX)

Defendants earlier moved this court to dismiss plaintiff's state law claims asserted in Counts X - XVII of plaintiff's original complaint. Defendants contended that, since the sole basis of subject matter jurisdiction over these claims was pendency to the federal question claims in Counts I - IX, the court should dismiss the state law claims if it grants defendants' motion to dismiss the federal law claims in counts I - IX.

However, plaintiff has since amended its complaint. The second amended complaint now alleges a separate basis for jurisdiction under 28 U.S.C. § 1332(a) (diversity). Plaintiff also has added two new counts, including an additional federal claim (Count XVIII — Correction of Inventorship) that is not disposed of by our ruling on the applicability of the 271(e)(1) defense. Thus, we hereby DENY defendants' motion to dismiss plaintiff's state law claims.

#### VI. CONCLUSION

Given the dispositive effect of the 271(e)(1) defense on Counts I - IX of plaintiff's second amended complaint, this court finds that there is no just reason for delaying final judgment on those counts, despite the

remaining federal law count and the state law counts. Thus, we ORDER entry of summary judgment on Counts I - IX.

IT IS SO ORDERED.

Court of Appeals, Federal Circuit

In re Vaeck

No. 91-1120

Decided October 21, 1991

#### PATENTS

##### 1. Patentability/Validity — Obviousness — Combining references (§115.0905)

Rejection of claimed subject matter as obvious under 35 USC 103 in view of combination of prior art references requires consideration of whether prior art would have suggested to those of ordinary skill in art that they should make claimed composition or device, or carry out claimed process, and whether prior art would also have revealed that such person would have reasonable expectation of success; both suggestion and reasonable expectation of success must be founded in prior art, not in applicant's disclosure.

##### 2. Patentability/Validity — Obviousness — Relevant prior art — Particular inventions (§115.0903.03)

Patent and Trademark Office has failed to establish prima facie obviousness of claims for use of genetic engineering techniques for producing proteins that are toxic to insects such as larvae of mosquitos and black flies, since prior art does not disclose, or suggest expression in cyanobacteria of chimeric gene encoding insecticidally active protein, or convey to those of ordinary skill reasonable expectation of success in doing so; expression of antibiotic resistance-conferring genes in cyanobacteria, without more, does not render obvious expression of unrelated genes in cyanobacteria for unrelated purposes.

##### 3. Patentability/Validity — Specification — Enablement (§115.1105)

#### JUDICIAL PRACTICE AND PROCEDURE

##### Procedure — Judicial review — Standard of review — Patents (§410.4607.09)

Specification must, in order to be enabling as required by 35 USC 112, first paragraph, teach person skilled in art to make and use

EXHIBIT

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invention without "undue experimentation," which does not preclude some experimentation; enablement is question of law which is reviewed independently on appeal, although such determination is based upon underlying factual findings which are reviewed for clear error.

## PATENTS

### 4. Patentability/Validity — Specification — Enablement (§115.1105)

Patent and Trademark Office did not err in rejecting, as non-enabling pursuant to 35 USC 112, first paragraph, claims for use of genetic engineering techniques for producing proteins that are toxic to insects such as larvae of mosquitos and black flies, in view of relatively incomplete understanding of biology of cyanobacteria as of applicants' filing date, as well as limited disclosure by applicants of particular cyanobacterial genera operative in claimed invention, since there is no reasonable correlation between narrow disclosure in applicants' specification and broad scope of protection sought in claims encompassing gene expression in any and all cyanobacteria.

Appeal from the U.S. Patent and Trademark Office, Board of Patent Appeals and Interferences.

Application for patent, serial no. 07/021,405, filed March 4, 1987, by Mark A. Vaeck, Wipa Chungjatupornchai, and Lee McIntosh (hybrid genes incorporating a DNA fragment containing a gene coding for an insecticidal protein, plasmids, transformed cyanobacteria expressing such protein and method for use as a biocontrol agent). From decision rejecting claims 1-48 and 50-52 as unpatentable under 35 USC 103, and rejecting claims 1-48 and 50-51 for lack of enablement, applicants appeal. Affirmed and part reversed in part; Mayer, J., dissents with opinion.

Ian C. McLeod, Okemos, Mich., for appellant.

Teddy S. Gron, associate solicitor (Fred E. McKelvey, solicitor and Richard E. Schafer, associate solicitor, with him on brief), for appellee.

Before Rich, Archer, and Mayer, circuit judges.

Rich, J.

This appeal is from the September 12, 1990 decision of the Patent and Trademark Office (PTO) Board of Patent Appeals and Interferences (Board), affirming the examiner's rejection of claims 1-48 and 50-52 of application Serial No. 07/021,405, filed March 4, 1987, titled "Hybrid Genes Incorporating a DNA Fragment Containing a Gene Coding for an Insecticidal Protein, Plasmids, Transformed Cyanobacteria Expressing Such Protein and Method for Use as a Biocontrol Agent," as unpatentable under 35 USC 103, as well as the rejection of claims 1-48 and 50-51 under 35 USC 112, first paragraph, for lack of enablement. We reverse the § 103 rejection. The § 112 rejection is affirmed in part and reversed in part.

## BACKGROUND

### A. The Invention

The claimed invention is directed to the use of genetic engineering techniques for production of proteins that are toxic to insects such as larvae of mosquitos and black flies. These swamp-dwelling pests are the source of numerous human health problems, including malaria. It is known that certain species of the naturally-occurring *Bacillus* genus of bacteria produce proteins ("endotoxins") that are toxic to these insects. Prior art methods of combatting the insects involved spreading or spraying crystalline spores of the insecticidal *Bacillus* proteins over swamps. The spores were environmentally unstable, however, and would often sink to the bottom of a swamp before being consumed, thus rendering this method prohibitively expensive. Hence the need for a lower-cost method of producing the insecticidal *Bacillus* proteins in high volume, with application in a more stable vehicle.

As described by appellants, the claimed subject matter meets this need by providing for the production of the insecticidal *Bacillus* proteins within host cyanobacteria. Although both cyanobacteria and bacteria are members of the procaryote<sup>2</sup> kingdom, the

<sup>1</sup> Basic vocabulary and techniques for gene cloning and expression have been described in *In re O'Farrell*, 853 F.2d 894, 895-99, 7 USPQ2d 1673, 1674-77 (Fed. Cir. 1988), and are not repeated here.

<sup>2</sup> All living cells can be classified into one of two broad groups, procaryotes and eucaryotes. The procaryotes comprise organisms formed of cells that do not have a distinct nucleus; their DNA floats throughout the cellular cytoplasm. In contrast, the cells of eucaryotic organisms such as man, other animals, plants, protozoa, algae and yeast have a distinct nucleus wherein their DNA resides.

cyanobacteria (which in the past have been referred to as "blue-green algae") are unique among procaryotes in that the cyanobacteria are capable of oxygenic photosynthesis. The cyanobacteria grow on top of swamps where they are consumed by mosquitos and black flies. Thus, when *Bacillus* proteins are produced within transformed cyanobacterial hosts according to the claimed invention, the presence of the insecticide in the food of the targeted insects advantageously guarantees direct uptake by the insects.

More particularly, the subject matter of the application on appeal includes a chimeric (i.e., hybrid) gene comprising (1) a gene derived from a bacterium of the *Bacillus* genus whose product is an insecticidal protein, united with (2) a DNA promoter effective for expressing the *Bacillus* gene in a host cyanobacterium, so as to produce the desired insecticidal protein.

The claims on appeal are 1-48 and 50-52, all claims remaining in the application. Claim 1 reads:

1. A chimeric gene capable of being expressed in Cyanobacteria cells comprising:
  - (a) a DNA fragment comprising a promoter region which is effective for expression of a DNA fragment in a Cyanobacterium; and
  - (b) at least one DNA fragment coding for an insecticidally active protein produced by a *Bacillus* strain, or coding for an insecticidally active truncated form of the above protein or coding for a protein having substantial sequence homology to the active protein,
 the DNA fragments being linked so that the gene is expressed.

Claims 2-15, which depend from claim 1, recite preferred *Bacillus* species, promoters, and selectable markers.<sup>3</sup> Independent claim 16 and claims 17-31 which depend therefrom are directed to a hybrid plasmid vector which

includes the chimeric gene of claim 1. Claim 32 recites a bacterial strain. Independent claim 33 and claims 34-48 which depend therefrom recite a cyanobacterium which expresses the chimeric gene of claim 1. Claims 50-51 recite an insecticidal composition. Claim 52 recites a particular plasmid that appellants have deposited.

### B. Appellants' Disclosure

In addition to describing the claimed invention in generic terms, appellants' specification discloses two particular species of *Bacillus* (*B. thuringiensis*, *B. sphaericus*) as sources of insecticidal protein; and nine genera of cyanobacteria (*Synechocystis*, *Anacystis*, *Synechococcus*, *Agmenellum*, *Aphanocapsa*, *Gloeocapsa*, *Nostoc*, *Anabaena* and *Ffremyllia*) as useful hosts.

The working examples relevant to the claims on appeal detail the transformation of a single strain of cyanobacteria, i.e., *Synechocystis* 6803. In one example, *Synechocystis* 6803 cells are transformed with a plasmid comprising (1) a gene encoding a particular insecticidal protein ("B.t. 8") from *Bacillus thuringiensis* var. *israelensis*, linked to (2) a particular promoter, the P<sub>L</sub> promoter from the bacteriophage Lambda (a virus of *E. coli*). In another example, a different promoter, i.e., the *Synechocystis* 6803 promoter for the rubisco operon, is utilized instead of the Lambda P<sub>L</sub> promoter.

### C. The Prior Art

A total of eleven prior art references were cited and applied, in various combinations, against the claims on appeal.

The focus of Dzelzkalns,<sup>6</sup> the primary reference cited against all of the rejected claims, is to determine whether chloroplast promoter sequences can function in cyanobacteria. To that end Dzelzkalns discloses the expression in cyanobacteria of a chimeric gene comprising a chloroplast promoter sequence fused to a gene encoding the enzyme chloramphenicol acetyl transferase (CAT).<sup>7</sup> Importantly, Dzelzkalns teaches the use of the CAT gene as a "marker" gene; this use of antibiotic resistance-conferring genes for selection purposes is a common technique in genetic engineering.

<sup>6</sup> 12 *Nucleic Acids Res.* 8917 (1984).

<sup>7</sup> Chloramphenicol is an antibiotic; CAT is an enzyme which destroys chloramphenicol and thus imparts resistance thereto.

<sup>3</sup> "Transformed" cyanobacteria are those that have successfully taken up the foreign *Bacillus* DNA such that the DNA information has become a permanent part of the host cyanobacteria, to be replicated as new cyanobacteria are generated.

<sup>4</sup> "Expression" of a gene refers to the production of the protein which the gene encodes; more specifically, it is the process of transferring information from a gene (which consists of DNA) via messenger RNA to ribosomes where a specific protein is made.

<sup>5</sup> In the context of the claimed invention, "selectable markers" or "marker genes" refer to antibiotic-resistance conferring DNA fragments, attached to the gene being expressed, which facilitate the selection of successfully transformed cyanobacteria.



Sekar I,<sup>8</sup> Sekar II,<sup>9</sup> and Ganesan<sup>10</sup> collectively disclose expression of genes encoding certain *Bacillus* insecticidal proteins in the bacterial hosts *B. megaterium*, *B. subtilis*, and *E. coli*.

Friedberg<sup>11</sup> discloses the transformation of the cyanobacterium *Anacystis nidulans* R2 by a plasmid vector comprising the O<sub>1</sub> P<sub>1</sub> operator-promoter region and a temperature-sensitive repressor gene of the bacteriophage Lambda. While the cyanobacteria are attractive organisms for the cloning of genes involved in photosynthesis, Friedberg states, problems may still be encountered such as suboptimal expression of the cloned gene, detrimental effects on cell growth of overexpressed, highly hydrophobic proteins, and rapid turnover of some gene products. To address these problems, Friedberg teaches the use of the disclosed Lambda regulatory signals in plasmid vehicles which, it states, have "considerable potential for use as vectors the expression of which can be controlled in *Anacystis*."

Miller<sup>12</sup> compares the initiation specificities *in vitro* of DNA-dependent RNA polymerases<sup>13</sup> purified from two different species of cyanobacteria (*Fremyella diplosiphon* and *Anacystis nidulans*), as well as from *E. coli*.

Nierzwicki-Bauer<sup>14</sup> identifies in the cyanobacterium *Anabaena* 7120 the start site for transcription of the gene encoding *rbcl*, the large subunit of the enzyme ribulose-1, 5-bisphosphate carboxylase. It reports that the nucleotide sequence 14-8 base pairs preceding the transcription start site "resembles a good *Escherichia coli* promoter," but that the sequence 35 base pairs before the start site does not.

Chauvat<sup>15</sup> discloses host-vector systems for gene cloning in the cyanobacterium *Synechocystis* 6803, in which the antibiotic resistance-conferring *neo* gene is utilized as a selectable marker.

Reiss<sup>16</sup> studies expression in *E. coli* of various proteins formed by fusion of certain foreign DNA sequences with the *neo* gene.

Kolowsky<sup>17</sup> discloses chimeric plasmids designed for transformation of the cyanobacterium *Synechococcus* R2, comprising an antibiotic-resistant gene linked to chromosomal DNA from the *Synechococcus* cyanobacterium.

Barnes, United States Patent No. 4,695,455, is directed to the treatment with stabilizing chemical reagents of pesticides produced by expression of heterologous genes (such as those encoding *Bacillus* proteins) in host microbial cells such as *Pseudomonas* bacteria. The host cells are killed by this treatment, but the resulting pesticidal compositions exhibit prolonged toxic activity when exposed to the environment of target pests.

#### D. The Grounds of Rejection

##### 1. The § 103 Rejections

Claims 1-6, 16-21, 33-38, 47-48 and 52 (which include all independent claims in the application) were rejected as unpatentable under 35 USC 103 based upon Dzelzkalns in view of Sekar I or Sekar II and Ganesan. The examiner stated that Dzelzkalns discloses a chimeric gene capable of being highly expressed in a cyanobacterium, said gene comprising a promoter region effective for expression in a cyanobacterium operably linked to a structural gene encoding CAT. The examiner acknowledged that the chimeric gene and transformed host of Dzelzkalns differ from the claimed invention in that the former's structural gene encodes CAT rather than insecticidally active protein. However, the examiner pointed out, Sekar I, Sekar II, and Ganesan teach genes encoding insecticidally active proteins produced by *Bacillus*, and the advantages of expressing such genes in heterologous<sup>18</sup> hosts to obtain larger quantities of the protein. The examiner contended that it would have been obvious to one of ordinary skill in the art to substitute the *Bacillus* genes taught by Sekar I, Sekar II, and Ganesan for the CAT gene in the vectors of Dzelzkalns in order to obtain high level expression of the *Bacillus* genes in the transformed cyanobacteria. The examiner further contended that it would have been obvious to use cyanobacteria as heterologous hosts for expression of the claimed genes due to the ability of cyanobacteria to serve as transformed hosts for the

<sup>137</sup> *Biochem. and Biophys. Res. Comm.* 748 (1986).

<sup>133</sup> *Gene* 151 (1985).

<sup>189</sup> *Mol. Gen. Genet.* 181 (1983).

<sup>203</sup> *Mol. Gen. Genet.* 505 (1986).

<sup>140</sup> *J. Bacteriology* 246 (1979).

<sup>15</sup> RNA polymerase, the enzyme responsible for making RNA from DNA, binds at specific nucleotide sequences (promoters) in front of genes in DNA, and then moves through the gene making an RNA molecule that includes the information contained in the gene. Initiation specificity is the ability of the RNA polymerase to initiate this process specifically at a site(s) on the DNA template.

<sup>181</sup> *Proc. Natl. Acad. Sci. USA* 5961 (1984).

<sup>204</sup> *Mol. Gen. Genet.* 185 (1986).

<sup>16</sup> *Gene* 211 (1984).

<sup>17</sup> *Gene* 289 (1984).

<sup>18</sup> Denotes different species or organism.

expression of heterologous genes. In the absence of evidence to the contrary, the examiner contended, the invention as a whole was *prima facie* obvious.

Additional rejections were entered against various groups of dependent claims which we need not address here. All additional rejections were made in view of Dzelzkalns in combination with Sekar I, Sekar II, and Ganesan, and further in view of other references discussed in Part C above.

The Board affirmed the § 103 rejections, basically adopting the examiner's Answer as its opinion while adding a few comments. The legal conclusion of obviousness does not require absolute certainty, the Board added, but only a reasonable expectation of success, citing *In re O'Farrell*, 853 F.2d 894, 7 USPQ2d 1673 (Fed. Cir. 1988). In view of the disclosures of the prior art, the Board concluded, one of ordinary skill in the art would have been motivated by a reasonable expectation of success to make the substitution suggested by the examiner.

## 2. The § 112 Rejection

The examiner also rejected claims 1-48 and 50-51 under 35 USC 112, first paragraph, on the ground that the disclosure was enabling only for claims limited in accordance with the specification as filed. Citing *Manual of Patent Examining Procedure* (MPEP) provisions 706.03(n)<sup>19</sup> and (z)<sup>20</sup> as support, the examiner took the position that undue experimentation would be required of the art worker to practice the

claimed invention, in view of the unpredictability in the art, the breadth of the claims, the limited number of working examples and the limited guidance provided in the specification. With respect to unpredictability, the examiner stated that

[t]he cyanobacteria comprise a large and diverse group of photosynthetic bacteria including large numbers of species in some 150 different genera including *Synechocystis*, *Anacystis*, *Synechococcus*, *Agmenellum*, *Nostoc*, *Anabaena*, etc. The molecular biology of these organisms has only recently become the subject of intensive investigation and this work is limited to a few genera. Therefore the level of unpredictability regarding heterologous gene expression in this large, diverse and relatively poorly studied group of procaryotes is high.

The Board affirmed, noting that "the limited guidance in the specification, considered in light of the relatively high degree of unpredictability in this particular art, would not have enabled one having ordinary skill in the art to practice the broad scope of the claimed invention without undue experimentation." *In re Fisher*, 427 F.2d 833, 166 USPQ 18 (CCPA 1970).

## OPINION

### A. Obviousness.

We first address whether the PTO erred in rejecting the claims on appeal as *prima facie* obvious within the meaning of 35 USC 103. Obviousness is a legal question which this court independently reviews, though based upon underlying factual findings which we review under the clearly erroneous standard. *In re Woodruff*, 919 F.2d 1575, 1577, 16 USPQ2d 1934, 1935 (Fed. Cir. 1990).

[1] Where claimed subject matter has been rejected as obvious in view of a combination of prior art references, a proper analysis under § 103 requires, *inter alia*, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process; and (2) whether the prior art would also have revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success. See *In re Dow Chemical Co.*, 837 F.2d 469, 473, 5 USPQ2d 1529, 1531 (Fed. Cir. 1988). Both the suggestion and the reasonable expectation of success must be founded in the prior art, not in the applicant's disclosure. *Id.*

<sup>19</sup> MPEP 706.03(n), "Correspondence of Claim and Disclosure," provides in part:

"In chemical cases, a claim may be so broad as to not be supported by [the] disclosure, in which case it is rejected as unwarranted by the disclosure."

<sup>20</sup> MPEP 796.03(z), "Undue Breadth," provides in part:

"[I]n applications directed to intentions in arts where the results are unpredictable, the disclosure of a single species usually does not provide an adequate basis to support generic claims. *In re Sol*, 1938 C.D. 723; 497 O.G. 546. This is because in arts such as chemistry it is not obvious from the disclosure of one species, what other species will work. *In re Dreshfield*, 1940 C.D. 351; 518 O.G. 255 gives this general rule: 'It is well settled that in cases involving chemicals and chemical compounds, which differ radically in their properties it must appear in an applicant's specification either by the enumeration of a sufficient number of the members of a group or by other appropriate language, that the chemicals or chemical combinations included in the claims are capable of accomplishing the desired result.'"

[2] We agree with appellants that the PTO has not established the prima facie obviousness of the claimed subject matter. The prior art simply does not disclose or suggest the expression in cyanobacteria of a chimeric gene encoding an insecticidally active protein, or convey to those of ordinary skill a reasonable expectation of success in doing so. More particularly, there is no suggestion in Dzelzkalns, the primary reference cited against all claims, of substituting in the disclosed plasmid a structural gene encoding *Bacillus* insecticidal proteins for the CAT gene utilized for selection purposes. The expression of antibiotic resistance-conferring genes in cyanobacteria, without more, does not render obvious the expression of unrelated genes in cyanobacteria for unrelated purposes.

The PTO argues that the substitution of insecticidal *Bacillus* genes for CAT marker genes in cyanobacteria is suggested by the secondary references Sekar I, Sekar II, and Ganesan, which collectively disclose expression of genes encoding *Bacillus* insecticidal proteins in two species of host *Bacillus* bacteria (*B. megaterium* and *B. subtilis*) as well as in the bacterium *E. coli*. While these references disclose expression of *Bacillus* genes encoding insecticidal proteins in certain transformed bacterial hosts, nowhere do these references disclose or suggest expression of such genes in transformed cyanobacterial hosts.

To remedy this deficiency, the PTO emphasizes similarity between bacteria and cyanobacteria, namely, that these are both procaryotic organisms, and argues that this fact would suggest to those of ordinary skill the use of cyanobacteria as hosts for expression of the claimed chimeric genes. While it is true that bacteria and cyanobacteria are now both classified as procaryotes, that fact alone is not sufficient to motivate the art worker as the PTO contends. As the PTO concedes, cyanobacteria and bacteria are not identical; they are classified as two separate divisions of the kingdom Procaryotae.<sup>2</sup> Moreover, it is only in recent years that the biology of cyanobacteria has been clarified, as evidenced by references in the prior art to "blue-green algae." Such evidence of recent uncertainty regarding the biology of cyano-

bacteria tends to rebut, rather than support, the PTO's position that one would consider the cyanobacteria effectively interchangeable with bacteria as hosts for expression of the claimed gene.

At oral argument the PTO referred to additional secondary references, not cited against any independent claim (i.e., Friedberg, Miller, and Nierzwicki-Bauer), which it contended disclose certain amino acid sequence homology between bacteria and cyanobacteria. The PTO argued that such homology is a further suggestion to one of ordinary skill to attempt the claimed invention. We disagree. As with the Dzelzkalns, Sekar I, Sekar II, and Ganesan references discussed above, none of these additional references disclose or suggest that cyanobacteria could serve as hosts for expression of genes encoding *Bacillus* insecticidal proteins. In fact, these additional references suggest as much about differences between cyanobacteria and bacteria as they do about similarities. For example, Nierzwicki-Bauer reports that a certain nucleotide sequence (i.e., the -10 consensus sequence) in a particular cyanobacterium resembles an *E. coli* promoter, but that another nearby nucleotide sequence (the -35 region) does not. While Miller speaks of certain promoters of the bacteriophage Lambda that are recognized by both cyanobacterial and *E. coli* RNA polymerases, it also discloses that these promoters exhibited differing strengths when exposed to the different polymerases. Differing sensitivities of the respective polymerases to an inhibitor are also disclosed, suggesting differences in the structures of the initiation complexes.

The PTO asks us to agree that the prior art would lead those of ordinary skill to conclude that cyanobacteria are attractive hosts for expression of any and all heterologous genes. Again, we can not. The relevant prior art does indicate that cyanobacteria are attractive hosts for expression of both native and heterologous genes involved in photosynthesis (not surprisingly, for the capability of undergoing oxygenic photosynthesis is what makes the cyanobacteria unique among procaryotes). However, these references do not suggest that cyanobacteria would be equally attractive hosts for expression of unrelated heterologous genes, such as the claimed genes encoding *Bacillus* insecticidal proteins.

In *O'Farrell*, this court affirmed an obviousness rejection of a claim to a method for

<sup>2</sup> *Stedman's Medical Dictionary* 1139 (24th ed. 1982) (definition of "Procaryotae"). Procaryotic organisms are commonly classified according to the following taxonomic hierarchy: Kingdom; Division; Class; Order; Family; Genus; Species. 3 *Bergey's Manual of Systematic Bacteriology* 1601 (1989).

producing a "predetermined protein in a stable form" in a transformed bacterial host. 853 F.2d at 895, 7 USPQ2d at 1674. The cited references included a prior art publication (the Polisky reference) whose three authors included two of the three coinventor-appellants. The main difference between the prior art and the claim at issue was that in Polisky, the heterologous gene was a gene for ribosomal RNA, while the claimed invention substituted a gene coding for a predetermined protein. *Id.* at 901, 7 USPQ2d at 1679. Although, as the appellants therein pointed out, the ribosomal RNA gene is not normally translated into protein, Polisky mentioned preliminary evidence that the transcript of the ribosomal RNA gene was translated into protein, and further predicted that if a gene coding for a protein were to be substituted, extensive translation might result. *Id.* We thus affirmed, explaining that the prior art explicitly suggested the substitution that is the difference between the claimed invention and the prior art, and presented preliminary evidence suggesting that the [claimed] method could be used to make proteins.

Polisky contained detailed enabling methodology for practicing the claimed invention, a suggestion to modify the prior art to practice the claimed invention, and evidence suggesting that it would be successful.

*Id.* at 901-02, 7 USPQ2d at 1679-80.

In contrast with the situation in *O'Farrell*, the prior art in this case offers no suggestion, explicit or implicit, of the substitution that is the difference between the claimed invention and the prior art. Moreover, the "reasonable expectation of success" that was present in *O'Farrell* is not present here. Accordingly, we reverse the § 103 rejections.

#### B. Enablement

[3] The first paragraph of 35 USC 112 requires, *inter alia*, that the specification of a patent enable any person skilled in the art to which it pertains to make and use the claimed invention. Although the statute does not say so, enablement requires that the specification teach those in the art to make and use the invention without "undue experimentation." *In re Wands*, 858 F.2d 731, 737, 8 USPQ2d 1400, 1404 (Fed. Cir. 1988). That *some* experimentation may be required is not fatal; the issue is whether the amount

of experimentation required is "undue." *Id.* at 736-37, 8 USPQ2d at 1404. Enablement, like obviousness, is a question of law which we independently review, although based upon underlying factual findings which we review for clear error. *See id.* at 735, 8 USPQ2d at 1402.

In response to the § 112 rejection, appellants assert that their invention is "pioneering," and that this should entitle them to claims of broad scope. Narrower claims would provide no real protection, appellants argue, because the level of skill in this art is so high, art workers could easily avoid the claims. Given the disclosure in their specification, appellants contend that any skilled microbiologist could construct vectors and transform many different cyanobacteria, using a variety of promoters and *Bacillus* DNA, and could easily determine whether or not the active *Bacillus* protein was successfully expressed by the cyanobacteria.

The PTO made no finding on whether the claimed invention is indeed "pioneering," and we need not address the issue here. With the exception of claims 47 and 48, the claims rejected under § 112 are not limited to any particular genus or species of cyanobacteria. The PTO's position is that the cyanobacteria are a diverse and relatively poorly studied group of organisms, comprising some 150 different genera, and that heterologous gene expression in cyanobacteria is "unpredictable." Appellants have not effectively disputed these assertions. Moreover, we note that only one particular species of cyanobacteria is employed in the working examples of appellants' specification, and only nine genera of cyanobacteria are mentioned in the entire document.

[4] Taking into account the relatively incomplete understanding of the biology of cyanobacteria as of appellants' filing date, as well as the limited disclosure by appellants of particular cyanobacterial genera operative in the claimed invention, we are not persuaded that the PTO erred in rejecting claims 1-46 and 50-51 under § 112, first paragraph. There is no reasonable correlation between the narrow disclosure in appellants' specification and the broad scope of protection sought in the claims encompassing gene expression in any and all cyanobacteria. *See In re Fisher*, 427 F.2d 833, 839, 166 USPQ 18, 24 (CCPA 1970) (the first paragraph of § 112 requires that the scope of the claims must bear a reasonable correlation to the scope of enablement provided by the specifi-



cation).<sup>22</sup> Accordingly, we affirm the § 112 rejection as to those claims.

In so doing we do *not* imply that patent applicants in art areas currently denominated as "unpredictable" must never be allowed generic claims encompassing more than the particular species disclosed in their specification. It is well settled that patent applicants are not required to disclose every species encompassed by their claims, even in an unpredictable art. *In re Angstadt*, 537 F.2d 498, 502-03, 190 USPQ 214, 218 (CCPA 1976). However, there must be sufficient disclosure, either through illustrative examples or terminology,<sup>23</sup> to teach those of ordinary skill how to make and how to use the invention as broadly as it is claimed. This means that the disclosure must adequately guide the art worker to determine, without undue experimentation, which species among all those encompassed by the claimed genus possess the disclosed utility. Where, as here, a claimed genus represents a diverse and relatively poorly understood group of microorganisms, the required level of disclosure will be greater than, for example, the disclosure of an invention involving a "predictable" factor such as a mechanical or electrical element. *See Fisher*, 427 F.2d at 839, 166 USPQ at 24. In this case, we agree with the PTO that appellants' limited disclosure does not enable one of ordinary skill to make and use the invention as now recited in claims 1-46 and 50-51 without undue experimentation.

Remaining dependent claim 47 recites a cyanobacterium which expresses the chimeric gene of claim 1, wherein the cyanobacteri-

um is selected from among the genera *Anacystis* and *Synechocystis*. Claim 48, which depend from claim 47, is limited to the cyanobacterium *Synechocystis* 6803. The PTO did not separately address these claims, nor indicate why they should be treated in the same manner as the claims encompassing all types of cyanobacteria. Although these claims are not limited to expression of genes encoding particular *Bacillus* proteins, we note what appears to be an extensive understanding in the prior art of the numerous *Bacillus* proteins having toxicity to various insects. The rejection of claims 47-48 under § 112 will not be sustained.

#### CONCLUSION

The rejection of claims 1-48 and 50-52 under 35 USC 103 is *reversed*. The rejection of claims 1-46 and 50-51 under 35 USC 112, first paragraph, is *affirmed* and the rejection of claims 47 and 48 thereunder is *reversed*.

**AFFIRMED-IN-PART, REVERSED-IN-PART**

**Mayer, J., dissenting.**

An appeal is not a second opportunity to try a case or prosecute a patent application, and we should not allow parties to "undertake to retry the entire case on appeal." *Perini America, Inc. v. Paper Converting Machine Co.*, 832 F.2d 581, 584, 4 USPQ2d 1621, 1624 (Fed. Cir. 1987); *Eaton Corp. v. Appliance Valves Corp.*, 790 F.2d 874, 877, 229 USPQ 668, 671 (Fed. Cir. 1986). But that is precisely what the court has permitted here. The PTO conducted a thorough examination of the prior art surrounding this patent application and concluded the claims would have been obvious. The board's decision based on the examiner's answer which comprehensively explains the rejection is persuasive and shows how the evidence supports the legal conclusion that the claims would have been obvious. Yet, the court ignores all this and conducts its own examination, if you will, as though the examiner and board did not exist. Even if I thought this opinion were more persuasive than the board's, I could not join it because it misperceives the role of the court.

The scope and content of the prior art, the similarity between the prior art and the claims, the level of ordinary skill in the art, and what the prior art teaches are all questions of fact. *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966); *Jurgens v. McKasy*, 927 F.2d 1552, 1560, 18 USPQ2d 1031, 1037 (Fed. Cir. 1991). And "[w]here there are two permissible views of

<sup>22</sup> The enablement rejection in this case was not based upon a post-filing date state of the art, as in *In re Hogan*, 559 F.2d 595, 605-07, 194 USPQ 527, 536-38 (CCPA 1977). *See also United States Steel Corp. v. Phillips Petroleum Co.*, 865 F.2d 1247, 1251, 9 USPQ2d 1461, 1464 (Fed. Cir. 1989) (citing *Hogan*); *Hormone Research Found., Inc. v. Genentech, Inc.*, 904 F.2d 1558, 1568-69, 15 USPQ2d 1039, 1047-48 (Fed. Cir. 1990) (directing district court, on remand, to consider effect of *Hogan* and *United States Steel* on the enablement analysis of *Fisher*), *cert. dismissed*, \_\_\_ U.S. \_\_\_, 111 S. Ct. 1434 (1991). We therefore do not consider the effect of *Hogan* and its progeny on *Fisher*'s analysis of when an inventor should be allowed to "dominate the future patentable inventions of others." *Fisher*, 427 F.2d at 839, 166 USPQ at 24.

<sup>23</sup> The first paragraph of § 112 requires nothing more than objective enablement. *In re Marzocchi*, 439 F.2d 220, 223, 169 USPQ 367, 369 (CCPA 1971). How such a teaching is set forth, either by the use of illustrative examples or by broad terminology, is irrelevant. *Id.*

the evidence, the factfinder's choice between them cannot be clearly erroneous." *Anderson v. City of Bessemer City*, 470 U.S. 564, 574 (1985). The mere denomination of obviousness as a question of law does not give the court license to decide the factual matters afresh and ignore the requirement that they be respected unless clearly erroneous. *In re Woodruff*, 919 F.2d 1575, 1577, 16 USPQ2d 1934, 1935 (Fed. Cir. 1990); *In re Kulling*, 897 F.2d 1147, 1149, 14 USPQ2d 1056, 1057 (Fed. Cir. 1990). There may be more than one way to look at the prior art, but on this record we are bound by the PTO's interpretation of the evidence because it is not clearly erroneous and its conclusion is unassailable. I would affirm on that basis.

bond and thus would not be furthered by retention of bond by ITC.

Appeal from the U.S. International Trade Commission.

U.S. International Trade Commission investigation no. 337-TA-293, instituted in response to complaint of Bristol-Myers Co., now Bristol-Myers Squibb Co., against, inter alia, Biocraft Laboratories Inc., for violation of Tariff Act's Section 337, 19 USC 1337. From order denying in part respondent's request for return or cancellation of two bonds posted in compliance with temporary cease and desist order, and from order denying respondent's request for reconsideration of prior order, respondent appeals. Reversed.

Prior decision: 15 USPQ2d 1258.

#### Court of Appeals, Federal Circuit

Biocraft Laboratories Inc. v. International Trade Commission

Nos. 91-1153, 1208

Decided October 17, 1991

#### PATENTS

1. U.S. International Trade Commission — Remedies (§155.07)

#### JUDICIAL PRACTICE AND PROCEDURE

Procedure — Settlement agreements; consent decrees (§410.43)

#### REMEDIES

Non-monetary and injunctive — Equitable relief — Preliminary injunctions — Bond (§505.0707.03)

International Trade Commission abused its discretion by refusing to release bond posted by respondent to 19 USC 1337 complaint in compliance with temporary cease and desist order, even though respondent made sales of infringing product during effective period of order, since complainant authorized sales in question and agreed to return of bond as part of settlement agreement with respondent, since bond provisions, under terms of order, do not apply to sales authorized by complainant, and since public interest in vindicating rights of patentees, as well as complainant's interest in offsetting competitive advantage respondent obtained by importing infringing product, were satisfied by complainant's agreement to return of

Marc S. Gross, of Bryan, Cave, McPheeters & McRoberts (Michael G. Biggers, Elizabeth C. Carver, David A. Rodman, and Elizabeth M. Garnhard, on brief), New York, N.Y., for appellant.

Marc A. Bernstein (Lyn Schlitt, general counsel, and James A. Toupin, assistant general counsel, on brief), for appellee.

Before Skelton, senior circuit judge, and Newman and Lourie, circuit judges.

Lourie, J.

This is a consolidated appeal from (1) an order of the United States International Trade Commission issued November 14, 1990, in *Crystalline Cefadroxil Monohydrate*, Inv. No. 337-TA-293, No. 91-1153, denying in part Biocraft Laboratories, Inc.'s request for return or cancellation of two bonds and (2) an order of the Commission issued January 11, 1991, Inv. No. 337-TA-293, No. 91-1208, denying Biocraft's request for reconsideration of the prior order. Because we conclude that the Commission's denial of Biocraft's requests was an abuse of discretion, we reverse.

#### BACKGROUND

This appeal stems from an investigation begun by the Commission in response to a complaint and motion for temporary relief filed by the Bristol-Myers Company<sup>1</sup> on February 1, 1989. In the complaint, Bristol

<sup>1</sup> The Bristol-Myers Company has since become the Bristol-Myers Squibb Company.

ion. *Id.* In compliance with 35 USC 16, this court enjoins the defendant from using the trademark in any manner that defendant report to the court within five (45) days of the date of this order in the manner and form in which the defendant has complied with this

order that the defendant print, packages, wrap, and advertisement in the defendant bearing the trademark in the case of a violation of this title, the word, device, combination, description, or representation, or subject of the violation, counterfeiting, imitation thereof, and matrices, and other the same, shall be delivered to the court.

This court orders that the defendant materials bearing the trademark in compliance with 15 USC 16, within five (45) days of the date of this order, voluntarily not to pro-

for profits, damages, fees, those claims are therefore the plaintiff's motion for

be GRANTED. It is

defendant, Thrifty Auto Inc., its officers, agents, and employees be permanently en-

for mark "Thrifty" for

name or mark which is

interfered copy or color-

plaintiff's marks

Car Rental, in con-

mobile sales or rental,

act or thing likely to

receive purchasers or

that defendant, or its

plaintiff or are in

with, sponsored or ap-

plaintiff's

defendant report to this

within five (45) days of the date

and form of its

on this further

to destroy all materi-

ney's fees are voluntarily dismissed with prejudice.

IT IS SO ORDERED.

# Court of Appeals, Federal Circuit

In re Donaldson Co. Inc.

No. 91-1386

Decided February 14, 1994

## JUDICIAL PRACTICE AND PROCEDURE

### 1. Procedure — Judicial review — Standard of review — Patents (§410.4607.09)

Obviousness of invention under 35 USC 103 is question of law, reviewed de novo on appeal; claim construction is likewise question of law if no underlying factual issues are present.

## PATENTS

### 2. Patentability/Validity — Construction of claims (§115.03)

#### Patent construction — Claims — Means (§125.1307)

Sixth paragraph of 35 USC 112, which states that means-plus-function claim shall be construed to cover corresponding structure, material, or acts described in specification and equivalents thereof, applies to claim interpretation arising as part of patentability determination in Patent and Trademark Office as well as to validity or infringement determination in court; PTO's past failure to apply sixth paragraph during prosecution does not justify continuation of such policy, nor does paragraph's failure to specifically state that it applies during prosecution give rise to ambiguity.

### 3. Patentability/Validity — Construction of claims (§115.03)

#### Patent construction — Claims — Means (§125.1307)

Circumstances surrounding enactment of 35 USC 112, sixth paragraph, do not warrant finding that application of paragraph should be limited to post-issuance claim interpretation, since paragraph was enacted to statutorily overrule holding that means-plus-function language could not be employed at exact point of novelty in combination claim, and not to codify reverse doctrine of equivalents, and since fact that issue

arose in context of infringement litigation does not suggest that application of paragraph six during patent prosecution was not intended.

### 4. Patentability/Validity — Construction of claims (§115.03)

#### Patent construction — Claims — Means (§125.1307)

Holding that sixth paragraph of 35 USC 112 applies to claim interpretation arising as part of patentability determination in Patent and Trademark Office does not conflict with principle that claims are to be given their "broadest reasonable interpretation" during prosecution, since holding merely sets limit, determined by "corresponding structure, material, or acts described in the specification and equivalents thereof," on how broadly PTO may construe means-plus-function language under "reasonable interpretation" rubric, nor does holding conflict with second paragraph of Section 112, or principle that limitations found only in specification should not be imported or read into claim, since operation of paragraph six requires applicant employing means-plus-function language to set forth adequate disclosure in specification in order to "particularly point out and distinctly claim" invention, and involves reference to specification for purpose of determining meaning of means-plus-function clause in claim, rather than for impermissibly adding limitation.

### 5. Patentability/Validity — Obviousness — Relevant prior art — Particular inventions (§115.0903.03)

#### Patent construction — Claims — Means (§125.1307)

Claim for industrial air-filtering device was not obvious in view of prior patent, since, in view of specification disclosure, claim language calling for "means, responsive to pressure increases in said [filtering] chamber . . . for moving particulate matter in downward direction" must be construed to require that hopper at bottom of chamber have at least one wall constructed of flexible, diaphragm-like material which expands outward under pressure, and since prior patent, which employs collector having hopper walls which are rigid and non-responsive to pressure, does not teach or suggest claimed flexible-wall, diaphragm-like structure.

#### Particular patents — Chemical — Filter assembly

4,395,269, Schuler, compact dust filter assembly, rejection of claim 1 of re-

EXHIBIT

F

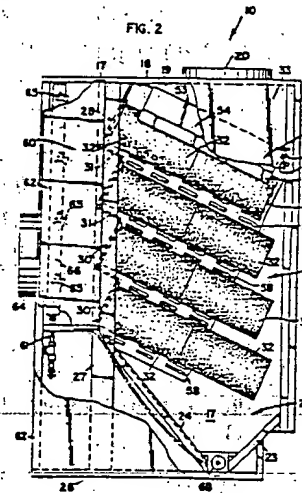
examination application no. 90/001,776, filed May 18, 1989, reversed.

001,776<sup>1</sup> (Schuler application) under 35 U.S.C. § 103. We reverse.

## I. BACKGROUND

### A. The Invention

The present invention relates to industrial air-filtering devices often referred to as "dust collectors." Fig. 2 of the Schuler application is reproduced below.



In operation, dust-laden air enters dirty-air chamber (22) through air inlet (20) at the top, passes through filters (32), and then exits through clean-air outlet (64) at the left. During this process, dust is collected on the outside of the filters. To periodically dislodge accumulated dust from the filters, the Schuler collector includes valve and nozzle assemblies (65), which direct jets of compressed air into the hollow interior of each filter. In doing so, the normal direction of air flow is reversed, thus dislodging a substantial portion of the dust accumulated on the outside of each filter. The dislodged dust then falls through the dirty-air chamber and accumulates at the bottom of the chamber in hopper (25), where it is removed by auger screw (68).

One problem with conventional collectors is that the dust accumulated in the hopper tends to harden or cake, thus interfering with the free movement of the accumulated dust downward to the auger screw. To overcome this problem, the Schuler collector takes ad-

Appeal from the U.S. Patent and Trademark Office, Board of Patent Appeals and Interferences.

Application of Donaldson Co. Inc. for reexamination of patent no. 4,395,269 (serial no. 90/001,776, filed May 18, 1989). From decision sustaining examiner's rejection of claim 1 in application on ground of obviousness under 35 USC 103, applicant appeals. Reversed.

R. Carl Moy, of Merchant, Gould, Smith, Edell, Welter & Schmidt, Minneapolis, Minn., for appellant.

Fred E. McKelvey, solicitor, PTO (Richard E. Schafer, associate solicitor and James T. Carmichael, assistant solicitor, with him on brief; Albin F. Drost, of counsel), for appellee.

Herbert I. Cantor, of Wegner, Cantor, Mueller & Player; John W. Schneller, Washington, D.C.; Anthony W. Shaw, Alexandria, Va., for amicus curiae, Bar Association of the District of Columbia.

William L. LaFuze, of Vinson & Elkins, Houston, Texas; Nancy J. Linck, of Cushman, Darby & Cushman, Washington; Harold C. Wegner, of Wegner, Cantor, Mueller & Player, Washington; H. Ross Workman, of Workman, Nydegger & Jensen, Salt Lake City, Utah, for amicus curiae, American Intellectual Property Law Association.

Before Nies, chief judge, and Rich, Newman, Archer, Mayer, Michel, Plager, Lourie, Clevenger, Rader, and Schall, circuit judges.

Rich, J.

The Donaldson Company (Donaldson) appeals from the January 30, 1991 decision of the Board of Patent Appeals and Interferences (Board) of the United States Patent and Trademark Office (PTO), reaffirmed on reconsideration on April 17, 1991, sustaining the Examiner's rejection of claim 1 of reexamination application Serial No. 90/-

<sup>1</sup> Reexamination application Serial No. 90/001,776, filed on May 18, 1989, is for a reexamination of U.S. Patent No. 4,395,269 (Schuler Patent), assigned to Donaldson.



vantage of the fact that every pulse of air from the nozzles causes the pressure within the dirty-air chamber to increase momentarily. At least one wall of the hopper of the Schuler collector (24) is made from a flexible material which in essence transforms the hopper into a diaphragm-like structure which expands outward in response to the temporary pressure increases. This movement breaks up any dust that may have hardened or caked onto the hopper. This flexible-wall, diaphragm-like structure also provides the additional advantages of deadening the sounds of the cleaning pulses and expanding the volume of the dirty-air chamber, thus allowing the air pulses to act more vigorously on the filters.

Claim 1, the only claim on appeal, reads, with insertion of reference numerals in brackets, as follows:

An air filter assembly [10] for filtering air laden with particulate matter, said assembly [10] comprising:

a housing having a clean-air chamber [60] and a filtering chamber [22], said housing having an upper wall [16], a closed bottom [26], and a plurality of side walls [17, 62] depending from said upper wall [16];

a clean air outlet [64] from said clean air chamber [60] in one of said side walls [62];

a dirty air inlet [20], to said filtering chamber [22] positioned in a wall [16] of said housing in a location generally above said clean air outlet [64];

means [28] separating said clean air chamber [60] from said filtering chamber [22] including means mounting a plurality of spaced-apart filter elements [32] within said filtering chamber [22], with each of said elements [32] being in fluid communication with said air outlet [64];

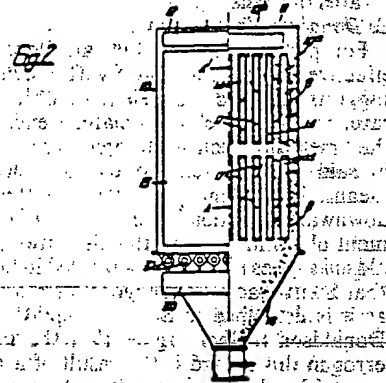
pulse-jet cleaning means [65], intermediate said outlet [64] and said filter elements [32], for cleaning each of said filter elements [32]; and

a lowermost portion [25] in said filtering chamber [22] arranged and constructed for the collection of particulate matter, said portion [25] having means [24] responsive to pressure increases in said chamber [22] caused by said cleaning means [65], for moving particulate matter in a downward direction to a bottommost point [65] in said portion [25] for subsequent transfer to a location exterior to said assembly [10]. [Emphasis ours.]

#### B. The Board Decision

In its initial January 30, 1991 decision, the Board relied solely upon the dust collector

disclosed in U.S. Patent No. 3,421,295 (Swift patent) to affirm the Examiner's rejection of claim 1. The Board did not find the secondary references relied upon by the Examiner<sup>2</sup> necessary to sustain the rejection. Swift's dust collector, illustrated below by Fig. 2 of the Swift patent, uses pulses of compressed, high-energy gas to counteract normal filter flow. These pulses of compressed gas dislodge particulate matter from spaced-apart filter elements (14), and the dislodged particulate matter moves towards the bottom of the hopper (16).



At page 5 of its initial decision, the Board noted Donaldson's arguments that Swift fails to disclose the use in its dust collector of a flexible surface which flexes in response to the gas pulses therein, but stated that:

while such a flexible sloping surface is a recited feature of the apparatus of claims 2, 3, and 5, this is *not* the case as to the apparatus of claim 1. Thus, [Donaldson's] argument is of no moment to claim 1. Moreover, we are convinced that hopper 16 of the gas filtering apparatus of Swift is "responsive" to pressure increases in the apparatus caused by the jet-cleaning means whereby filtered particulate matter is caused to move in a downward direction. Thus, we agree with the examiner that there is no apparent distinction between the "lowermost portion" of the apparatus recited in claim 1 and the corresponding portion of the apparatus of Swift.

Thus, the Board did not interpret the "means, responsive to pressure increases in said chamber caused by said cleaning means, for moving particulate matter in a downward direction" language recited in the last paragraph of claim 1 as limited to the flexible

<sup>2</sup> The other references were U.S. Patent No. 4,409,009 issued to Lissy (Lissy patent) and U.S. Patent No. 2,732,099 issued to Davis (Davis patent).

wall, diaphragm-like structure disclosed in Schuler's specification, and equivalents thereof. Indeed, the Board specifically stated at page 2 of its decision on reconsideration mailed April 17, 1991:

It is axiomatic that particular features or limitations appearing in the specification are *not* to be read into the claims of an application. [citations omitted] Thus, contrary to [Donaldson's] argument, a flexible sloping surface is *not* a feature of the air filtering apparatus of claim 1 which distinguishes it over the air filtering apparatus of Swift.

#### C. Donaldson's Assertions

For purposes of this appeal, Donaldson effectively concedes that Swift teaches or suggests each and every element of the apparatus recited in Schuler's claim 1 except for the "means, responsive to pressure increases in said chamber caused by said cleaning means, for moving particulate matter in a downward direction" recited in the last segment of claim 1. As to this limitation, Donaldson argues that the Board erred in holding that Swift teaches or suggests such a means as it is described in Schuler's specification. Donaldson further argues that the Board's error in this regard is the result of a fundamental legal error by the Board, namely the Board's failure to obey the statutory mandate of 35 U.S.C. § 112, paragraph six, in construing this claim.

## H. DISCUSSION

### A. Standard of Review

[1] Obviousness under section 103 is a question of law that this court reviews de novo. *In re Woodruff*, 919 F.2d 1575, 1577, 16 USPQ2d 1934, 1935 (Fed. Cir. 1990). Similarly, our precedent is that claim construction, when, as here, there are no underlying factual issues, is also a question of law that we review de novo. *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 771, 218 USPQ 781, 789 (Fed. Cir.), cert. denied, 465 U.S. 1026 [224 USPQ 520] (1984). In this case, the PTO erred in its construction of the "means-plus-function" language recited in the last segment of Schuler's claim 1, and this error consequently led the PTO to impose an improper obviousness rejection.

### B. 35 U.S.C. § 112, Paragraph Six

When statutory interpretation is at issue, the plain and unambiguous meaning of a statute prevails in the absence of clearly expressed legislative intent to the contrary. See *Mansell v. Mansell*, 490 U.S. 581, 592, (1989); *Hoechst Aktiengesellschaft v. Quigg*, 917 F.2d 522, 526, 16 USPQ2d 1549,

1552 (Fed. Cir. (1990)). The statutory language at issue in this case reads:

An element in a claim for a combination "may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim *shall be construed* to cover the corresponding structure, material, or acts described in the specification and equivalents thereof. [Emphasis ours.]

35 U.S.C. § 112, paragraph 6 (1988).

[2] The plain and unambiguous meaning of paragraph six is that one construing means-plus-function language in a claim must look to the specification and interpret that language in light of the corresponding structure, material, or acts described therein, and equivalents thereof, to the extent that the specification provides such disclosure. Paragraph six does not state or even suggest that the PTO is exempt from this mandate, and there is no legislative history indicating that Congress intended that the PTO should be.<sup>3</sup> Thus, this court must accept the plain

<sup>3</sup> There is no evidence that, at the time of the Act of July 24, 1965, Pub. L. No. 89-83, § 9, 1965 U.S.C.A.N. (79 Stat.) 259, or the Act of Nov. 14, 1975, Pub. L. No. 94-131, § 7, 1975 U.S.C.A.N. (89 Stat.) 685, which reenacted the third paragraph of section 112, now the sixth paragraph, Congress was specifically aware of the PTO's allegedly sweeping practice of interpreting means-plus-function language as reading on each and every means of performing that function, or of any CCPA decision condoning such a practice, and we do not find this reenactment without awareness to indicate clear Congressional approval or disapproval. See *AFL-CIO v. Brock*, 835 F.2d 912, 916 n.6 (D.C. Cir. 1987) (stating that no case has rested merely on presumptive knowledge, noting that, in *Lindahl v. OPM*, 450 U.S. 768, 782-86 (1984), relied upon by the Commissioner here, there was evidence in the legislative history that Congress was aware of the particular interpretation at issue), citing with approval, C. Sands, SUTHERLAND ON STATUTORY CONSTRUCTION, § 49.09 (4th ed. 1984) (rule of implied adoption of agency interpretation does not apply where nothing indicates that the legislature had its attention directed to such interpretation upon reenactment.); see also *General American Transp. v. Interstate Commerce Comm.*, 872 F.2d 1048, 1053 (D.C. Cir. 1989). In addition, P.J. Federico's post-ACT "Commentary on the New Patent Act," 35 U.S.C.A. § 1 (1954 ed., West), reprinted in 75 JPOS 162 (1993), is not legislative history per se that may be relied upon to indicate Congressional intent. Even if it were, the comments contained therein do not suggest that Federico knew of any particular intent by Congress regarding the manner in which the sixth paragraph, then the third paragraph, should be ap-

and precise language of paragraph six. *See Mansell supra*; see also *Diamond v. Chakrabarty*, 447 U.S. 303, 308 [206 USPQ 193] (1980) ("courts 'should not read into the patent laws limitations and conditions which the legislature has not expressed' "), quoting *United States v. Dubilier Condenser Corp.*, 289 U.S. 178, 199 [17 USPQ 154] (1933). Accordingly, because no distinction is made in paragraph six between prosecution in the PTO and enforcement in the courts, or between validity and infringement, we hold that paragraph six applies regardless of the context in which the interpretation of means-plus-function language arises, i.e., whether as part of a patentability determination in the PTO or as part of a validity or infringement determination in a court.<sup>4</sup> To the extent that *In re Lundberg*, 244 F.2d 543, 113 USPQ 530 (CCPA 1979), *In re Arbeit*, 206 F.2d 947, 99 USPQ 123 (CCPA 1953), or any other precedent of this court suggests or holds to the contrary, it is expressly overruled.

The Commissioner argues that his interpretation is entitled to deference in view of what the Commissioner alleges is the PTO's sweeping and long-standing practice of not applying paragraph six during examination. We disagree. The fact that the PTO may have failed to adhere to a statutory mandate over an extended period of time does not justify its continuing to do so. In addition, paragraph six facially covers every situation involving the interpretation of means-plus-function language, and the Commissioner's

plied. In this particular, he was merely stating his personal views.

\* *Accord, Arrhythmia Research Technology v. Corazonix Corp.*, 958 F.2d 1053, 1060, 22 USPQ2d 1033, 1038 (Fed. Cir. 1992) (infringement determination); *In re Bond*, 910 F.2d 831, 833, 15 USPQ2d 1566, 1568 (Fed. Cir. 1990) (patentability over prior art determination); *In re Iwahashi*, 888 F.2d 1370, 1375, 12 USPQ2d 1908, 1912 (Fed. Cir. 1989); *Johnston v. Ivac Corp.*, 885 F.2d 1574, 1580, 12 USPQ2d 1382, 1386 (Fed. Cir. 1989) (infringement determination); *In re Meyer*, 688 F.2d 789, 796, 215 USPQ 193, 199 (CCPA 1982) (section 101 patentability determination); *In re Knowlton*, 481 F.2d 1357, 1366, 178 USPQ 486, 492-93 (CCPA 1973) (patentability determination as to section 112 and prior art); *In re Foster*, 438 F.2d 1011, 1016, 169 USPQ 99, 102 (CCPA 1971) (section 101 patentability determination); *In re Bernhart*, 417 F.2d 1395, 1399, 163 USPQ 611, 615 (CCPA 1969) (section 101 patentability determination); *In re Prater*, 415 F.2d 1393, 1406, 162 USPQ 541, 551-52 (CCPA 1969) (section 103 patentability determination). See also generally R. Carl Moy, *The Interpretation of Means Expressions During Prosecution*, 68 JPOS 246 (1986).

attempts to create an ambiguity in paragraph six where none exists are to no avail. The fact that paragraph six does not specifically state that it applies during prosecution in the PTO does not mean that paragraph six is ambiguous in this respect. Quite the contrary, we interpret the fact that paragraph six fails to distinguish between prosecution in the PTO and enforcement in the courts as indicating that Congress did not intend to create any such distinction.

In addition, section 112 as a whole relates to requirements for the specification and claims without regard to whether a patent or patent application is involved. Moreover, section 112 is found in Chapter 11 of Title 35, titled “Application for Patent,” which supports our holding that section 112, paragraph six, governs the interpretation of “means” clauses in a claim for a combination when being examined in pending applications.

[3] The Commissioner argues that Congress enacted paragraph six to codify the "reverse doctrine of equivalents" for means-plus-function claim language, a claim interpretation tool which finds application only in the litigation context, wherefore Congress must have intended paragraph six to apply only in the context of post-issuance infringement and validity actions. We see no merit in this imaginative reasoning, and no support for it has been cited. The record is clear on why paragraph six was enacted. In *Halliburton Oil Well Cementing Co. v. Walker*, 329 U.S. 1 [71 USPQ 175] (1946), the Supreme Court held that means-plus-function language could not be employed at the exact point of novelty in a combination claim. Congress enacted paragraph six, originally paragraph three, to statutorily overrule that holding. See *In re Fuetterer*, 319 F.2d 259, 264 n.11, 138 USPQ 217, 222 n.11 (CCPA 1963) (noting that it was Congress's intent to restore the law regarding broad functional language in combination claims to its state prior to *Halliburton*). The fact that the question of how to treat means-plus-function language came to Congress's attention through the context of infringement litigation does not suggest that Congress did not intend paragraph six to apply to all interpretations of means-plus-function claim language. Furthermore, there is no legislative history suggesting that Congress's purpose in enacting paragraph six was to codify the reverse doctrine of equivalents,<sup>9</sup> and thus there is no

3. Of course, this is not to say that this may not have been one of the results of enacting this paragraph. In *Johnston v. IVAC Corp.*, 885 F.2d 1574, 1580, 12 USPO2d 1382, 1386-87 (Fed.



reason to believe that Congress intended to limit the application of paragraph six to post-issuance claim interpretation.

[4] Contrary to suggestions by the Commissioner, our holding does not conflict with the principle that claims are to be given their "broadest reasonable interpretation" during prosecution. See, e.g., *In re Prater*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-51 (CCPA, 1969).<sup>4</sup> Generally speaking, this claim interpretation principle remains intact. Rather, our holding in this case merely sets a limit on how broadly the PTO may construe means-plus-function language under the rubric of "reasonable interpretation." Per our holding, the "broadest reasonable interpretation" that an examiner may give means-plus-function language is that statutorily mandated in paragraph six. Accordingly, the PTO may not disregard the structure disclosed in the specification corresponding to such language when rendering a patentability determination.

Our holding similarly does not conflict with the second paragraph of section 112.<sup>5</sup> Indeed, we agree with the general principle espoused in *In re Lundberg*, 244 F.2d at 547-48, 113 USPQ at 534 (CCPA 1979), that the sixth paragraph of section 112 does not exempt an applicant from the requirements of the first two paragraphs of that section. Although paragraph six statutorily provides that one may use means-plus-function language in a claim, one is still subject to the requirement that a claim "particularly point out and distinctly claim" the invention. Therefore, if one employs means-plus-function language in a claim, one must set forth in the specification an adequate disclosure showing what is meant by that language. If an applicant fails to set forth an adequate disclosure, the applicant has in effect failed to particularly point out and distinctly claim the invention as required by the second paragraph of section 112.

Cir. 1989), this court noted that paragraph six effectively restricts the scope that one would attribute to means-plus-function language if one were to read it in a vacuum without reference to the specification.

Of interest, the *Prater* court distinguished the apparatus claim therein from the process claims at issue on the basis that the apparatus claim employed "typical means-plus-function language as expressly permitted by the third paragraph [now sixth] of 35 U.S.C. § 112." *In re Prater*, 415 F.2d at 1406, 162 USPQ at 551-52.

The second paragraph of 35 U.S.C. § 112 reads:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Also contrary to suggestions by the Commissioner, our holding does not conflict with the general claim construction principle that limitations found only in the specification of a patent or patent application should not be imported or read into a claim. See *In re Priest*, 582 F.2d 33, 37, 199 USPQ 11, 15 (CCPA 1978). The Commissioner confuses impermissibly imputing limitations from the specification into a claim with properly referring to the specification to determine the meaning of a particular word or phrase recited in a claim. See *E.I. Du Pont de Nemours & Co. v. Phillips Petroleum Co.*, 849 F.2d 1430, 1433, 7 USPQ2d 1129, 1131 (Fed. Cir. 1988) (discusses importance of distinguishing between the two). What we are dealing with in this case is the construction of a limitation already in the claim in the form of a means-plus-function clause and a statutory mandate on how that clause must be construed.

### C. Application of Paragraph Six to Claims

For the foregoing reasons, the PTO was required by statute to look to Schuler's specification and construe the "means" language recited in the last segment of claim 1 as limited to the corresponding structure disclosed in the specification and equivalents thereof.<sup>6</sup> The particular means language of claim 1 at issue reads:

means, responsive to pressure increases in said chamber caused by said cleaning means, for moving particulate matter in a downward direction to a bottommost point in said [lowermost] portion for subsequent transfer to a location exterior to said assembly.

In the "Summary of the Invention" section of his specification, Schuler states:

A lowermost portion of the assembly is arranged and constructed to collect the removed particulate matter. The collection portion includes a sloping surface constructed of a material which flexes in response to the pressure differentials created within the chamber during the operation of the pulse-jet cleaning means.

[t]he sloping surface of the collection portion of the assembly moves outward, or flexes, as the pressure increases within

<sup>4</sup> The word "equivalent" in 35 U.S.C. § 112, paragraph 6, should not be confused with the doctrine of equivalents. *D.M.I., Inc. v. Deere & Co.*, 755 F.2d 1570, 1575, 225 USPQ 236, 239 (Fed. Cir. 1985); see also *Pennwalt Corp. v. Durand-Wayland, Inc.*, 833 F.2d 931, 933-34, 4 USPQ2d 1737, 1741 (Fed. Cir.) (en banc), cert. denied, 485 U.S. 961 (1988).

visions by the Commissioner not conflict with the principle that the specification of the invention should not be

claim. See *In re* 199 USPQ 11, 15. The Commissioner confuses limitations from the with properly referred to determine the word or phrase recited in *Pont de Nemours & Co.*, 849 F.2d 1129, 1131 (Fed. Cir. 1988). What we are is the construction in the claim in the action clause and a law that clause must

#### Graph Six to Claims

sons, the PTO was like to Schuler's specification of claim 1 as meaning structure, position and equivalents means language of

pressure increases in said cleaning means to collect particulate matter in a bottommost portion for subsequent removal exterior to said

the invention, see Schuler states that the assembly is directed to collect the matter. The collection sloping surface that which flexes in response to pressure differentials created during the operation of the cleaning means

the collection portion moves outward or inward in response to pressure increases within

USPC 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000

the chamber with each operation of the pulse-jet means. The flexing movement allows the air entraining the dust from the filter element to travel towards the collection area, thereby helping to prevent the removed dust from being re-deposited on a neighboring filter element. Also, the flexing surface dampens the noise and vibrations of the pulse jet cleaning means, and moves the dust collected on its surface towards the collection area for subsequent removal from the assembly itself. [Emphasis ours.]

*Schuler Patent*, Col. 2, lines 6-12, 28-39. In discussing a preferred embodiment of his dust collector, Schuler further describes the "means, responsive to pressure" recited in claim 1 as follows:

The larger surface area 24 is designed and arranged to act as a diaphragm which is movably responsive to the pressure differentials created within the dirty air chamber 22 by the operation of the pulse jet cleaning means 65, 66. The diaphragm 24 is preferably made from a flexible, reinforced rubber sheet material. However, any material sufficiently strong and flexible could be used, i.e., a relatively thin metal panel which will flex. The diaphragm movement caused by the operation of the pulse jet cleaning means will be explained in detail below.

*Schuler Patent*, Col. 6, lines 21-31. The further explanation referred to reads:

During the operation of the pulse-jet cleaning means the larger, sloping surface or diaphragm 24 moves outward or away from the filter elements 32 in response to the increase in pressure within the dirty air chamber 22. This outward flexing is shown in broken lines in FIG. 2. As the pressure diminishes, the surface 24 flexes back to its normal position.

The pressure-responsive, flexing movement of the larger sloping surface 24 accomplishes four important functions: (1) the movement allows air entraining the removed dust to move downwardly towards the hopper; (2) it helps prevent the removed dust and particulate matter from being re-deposited onto adjacent elements; (3) it helps to dampen the noise and the vibrations of the pulse-jet cleaning means; and (4) it helps to move the particulate matter which has settled on the diaphragm surface towards the auger screw. As the particulate matter accumulates in the lowermost portion 25 upon the auger screw 68, it is removed, by the operation of the auger screw 68, to a location exterior to the filter assembly. There is nearly zero dirty air velocity at the point adjacent to

the auger screw, as a result of the dirty air inlet not being in nor even adjacent to the particulate matter collection area of the filter assembly.

*Schuler Patent*, Col. 7, lines 42-66.

[5] A review of the foregoing excerpts leads to the inescapable conclusion that Schuler's specification defines the "means, responsive to pressure increases in said chamber . . . for moving particulate matter in a downward direction" language recited in claim 1 as a flexible-wall, diaphragm-like structure, such that the hopper is made up of at least one flexible wall which expands outward upon pressure increases, thus causing caked-on dust to break loose from the wall of the hopper and fall towards the auger screw due to gravity.

#### D. Swift

The Swift collector does not teach or suggest the flexible-wall, diaphragm-like structure claimed by Schuler. Indeed, there is no teaching or suggestion in Swift that the hopper walls therein be anything but rigid and non-responsive to any pressure increases within the collector. Consequently, it would not have been obvious to one of ordinary skill in the art to modify Swift to obtain Schuler's flexible-wall, diaphragm-like structure. In this regard, we note that the Board itself specifically held at page 6 of its initial decision that the examiner had failed to establish a *prima facie* case of obviousness as to claims 2, 3, and 5, because Swift and the other references relied upon by the examiner fail to disclose or render obvious the feature of the lowermost portion of the claimed apparatus comprising the flexible sloping surface which flexes in response to increases in pressure in the apparatus caused by the pulse-jet cleaning means whereby filtered particulate matter is moved in a downward direction.

Notwithstanding this explicit holding by the Board that Swift fails to teach or suggest the flexible-wall, diaphragm-like structure that Schuler discloses in his specification as corresponding to the "means" language recited in the last segment of claim 1, the Commissioner nevertheless argues that the examiner found, and the Board allegedly implicitly agreed, that Swift's hopper walls respond to jet-cleaning pressure increases by vibrating, and that Donaldson has failed to establish that this allegedly responsive structure is not an "equivalent" to Schuler's disclosed flexible-wall, diaphragm-like structure. The Commissioner further contends that the slanted hopper walls in Swift's collector satisfy the "means, responsive to pressure" language of claim 1.

The Commissioner's arguments appear to address concepts of anticipation under 35 U.S.C. § 102. However, neither the Examiner nor the Board imposed an anticipation rejection under section 102. The only rejection before this court is one of obviousness under section 103.

Nevertheless, as explained previously, section 112, paragraph six, requires us and the PTO to construe the "means, responsive to pressure" language recited in claim 1 as limited to a flexible-wall, diaphragm-like structure as disclosed in Schuler's specification, or an "equivalent" thereof. In this regard, the Commissioner has failed to establish the existence in conventional hopper structures like Swift's of any inherent vibrations resulting from pulse-jet cleaning sufficient to loosen hardened dust that gathers on hopper walls.<sup>1</sup> Thus, because the Commissioner's unsupported assertion that Swift's hopper walls would vibrate in response to pressure increases caused by pulse-jet cleaning is mere speculation unsupported by any rational basis for believing it might be true, the burden clearly did not shift to Schuler to establish non-equivalence. Furthermore, the Commissioner has failed to persuade us that such vibration, even if it did occur, should be viewed as making Swift's hopper structure an "equivalent" of Schuler's flexible-wall, diaphragm-like structure.

As to the Commissioner's arguments regarding Swift's slanted hopper walls, we note that neither the examiner nor the Board ever asserted that these slanted walls by themselves represent an "equivalent" of Schuler's flexible-wall, diaphragm-like structure. In addition, the Commissioner has failed to set forth any reasonable explanation as to how Swift's walls are "responsive to pressure increases."

In summary, Schuler's claimed collector would not have been obvious in view of Swift's collector having hopper walls which are rigid and non-responsive to pressure increases within the collector. In addition, even if the issue of anticipation under section 102 were before us, which it is not, the Commissioner could not have argued anticipation

because he has failed to establish that the rigid hopper wall structure in Swift's collector is an "equivalent" of the flexible wall, diaphragm-like hopper structure in Schuler's claim 1 collector.

### CONCLUSION

For the foregoing reasons, we hold, as a matter of law, that Swift does not render the structure defined by claim 1 obvious under 35 U.S.C. § 103, and therefore we reverse the decision of the Board. On the record before us, we see no reason to remand this case for further findings as to "equivalents" as suggested by the Commissioner.

### REVERSED

District Court, D. New Jersey

New England Medical Center Hospitals Inc.  
v. PeproTech Inc.

No. 91-5584 (GEB)

Decided August 30, 1993

(Unpublished)

### PATENTS

#### 1. Infringement — Construction of claims (\$120.01)

Claim, in patent in suit covering recombinant DNA which codes for interleukin-1B, which provides for "process for preparing human IL-1B which comprises culturing a microbe hosting a cloning vehicle comprising DNA encoding human IL-1B and recovering human IL-1B," is not, in view of patent specification and prosecution history, limited to full-length IL-1B precursor protein but encompasses protein's fragments as well.

#### Particular patents — Chemical — DNA

4,766,069, Aaron, Dinarello, Webb, Rich, and Wolff, recombinant DNA which codes for interleukin-1B, scope of claim 12 determined.

<sup>1</sup> We note that the Lissy patent discloses a dust collector in which the hopper walls thereof are actuated mechanically by vibrators to loosen caked-on dust so that it can fall to the bottom of the hopper. *Lissy Patent*, Col. 2, lines 4-8; Col. 4, lines 20-27. If conventional pulse-jet cleaning provided sufficient vibrations to loosen caked-on dust, Lissy presumably would not have found it necessary to add vibrators. Similarly, Davis presumably would not have found it necessary to use the inflatable membrane described therein. *Davis Patent*, Col. 4, lines 23-58.

Action by New England Medical Center Hospitals Inc., Trustees of Tufts College, Massachusetts Institute of Technology, Wellesley College, and Cistron Biotechnology Inc., against PeproTech Inc., for patent infringement. On cross motions for partial summary judgment on issue of scope of claim 12 of patent in suit, Plaintiffs' motion granted.

[Editor's Note: This opinion as been designated as "not for publication."]



ks admitted that email communications ted to Volkswagen were received by al Works. This evidence of actual con n is determinative of infringement. cent case law holds that internet cyper- y constitutes per se trademark dilution. *Panavision Int'l L.P. v. Toeppen*, 141 1316, 1327 [46 USPQ2d 1511] (9th 1998) (holding that misappropriating in name "panavision.com" and at- ing to sell that domain name to the ul owner of Panavision mark constitut- ion). Dilution is "the lessening of a ty of a famous mark to identify and ish goods and services, regardless of esence or absence of — (1) competi- tween the owner of the famous mark her parties; or (2) likelihood of confu- mistake, or deception." 15 U.S.C. *Washington Speakers Bureau v. g Authorities*, 33 F.Supp.2d 488, 502 [PQ2d 1893] (E.D. Va. 1999). Courts eld that dilution may be done by ng, which is described as "if the de- uses the word as its own trademark ds that are so different that no confu- source or sponsorship can occur." 3 *Virtual Trademarks and Unfair Com-*  §24,103 at 24,188 (4th ed. 1998). ample, "the use of DuPont shoes, pirin and Kodak pianos would be e under the law of trademark dilu- *Washington Speakers Bureau*, 33 d 488 [49 USPQ2d 1893] at fn. 32 ng associated with Virtual Works of Volkswagen constitutes trade- tion. Volkswagen has experienced arm as a result of not being able NEI and as a result of this Virtual Works reasons, the Court finds that is in violation of the mark of and that Volkswagen is entitled under a theory of cyberspiracy. *Virtual Works* Motion for Sum- for its counterclaims of ution, trademark, infringe- ury should be granted and Motion for Summary Judg- denied. Order shall issue.

U.S. Court of Appeals  
Federal Circuit

IMS Technology Inc. v. Haas Automation  
Inc.

Nos. 99-1019, -1067

Decided March 27, 2000

PATENTS

1. Patent construction — Claims — Broad  
or narrow (§125.1303)

Patent construction — Claims — Means  
(§125.1307)

Doctrine of claim differentiation does not require that structure corresponding to "inter-  
face means" of independent means-plus-function claim relating to machine tool control be limited to disclosed peripheral inter-  
face adapter, since scope of dependent claims is clearly narrower than that of inde-  
pendent claim; and claim differentiation is maintained when disclosed structure corre-  
sponding to independent means-plus-func-  
tion claim is recited in dependent claim; and since it is permissible for claims at issue to have similar scope after each is correctly construed in light of structures disclosed in written description, in that judicially created doctrine of claim differentiation cannot over-  
ride statutory mandate of 35 U.S.C. §112, sixth paragraph.

2. Patent construction — Claims — Defin-  
ing terms (§125.1305)

Patent construction — Claims — Means  
(§125.1307)

Sixth paragraph of 35 U.S.C. §112 does not limit all terms in means-plus-function or step-plus-function clause to what is disclosed in written description and equivalents there-  
of, since Section 112, sixth paragraph ap-  
plies only to interpretation of means or step that performs recited function when claim recites insufficient structure or acts for per-  
forming that function; in present case, term "data block," appearing in means-plus-func-  
tion limitations of claims relating to machine tool control, is not subject to Section 112, sixth paragraph, and its meaning is not limit-  
ed to specific variables and display sequence disclosed in written description as preferred embodiment.

3. Patent construction — Claims — Broad  
or narrow (§125.1303)

Phrase "control apparatus" in preambles of claims relating to machine tool control does not limit those claims to control appa-

tus that is separate from machine tool, since preamble does not act as claim limitation, and is irrelevant to proper construction of claim, if it adds no limitations to those in body of claim, and since phrase "control apparatus" merely gives descriptive name to set of limitations in body of claims that completely set forth invention; claims thus may be infringed by machine tool apparatus that includes claimed control features, or by control apparatus that is separate from and communicates with machine tool apparatus.

4. Infringement — Tests (§120.09)

Context of invention should be considered in performing equivalence analysis under 35 U.S.C. §112, sixth paragraph, just as it is in doctrine of equivalence analysis, in view of similarity of proper tests; thus, two struc-  
tures that are equivalent in one environment may not be equivalent in another, and if, in claimed "means" limitation, disclosed phys-  
ical structure is of little or no importance to claimed invention, there may be broader range of equivalent structures than if phys-  
ical characteristics of structure are critical in performing claimed function in context of claimed invention.

5. Infringement — Literal infringement  
(§120.05)

Patent construction — Claims — Means  
(§125.1307)

Genuine issues of material fact exist as to whether floppy disk drive of accused device can be equivalent, under 35 U.S.C. §112, to tape cassette transport disclosed in means-plus-function claims relating to machine tool control, since, considering substantiality of differences in context of claimed invention, case does not appear to present situation in which any physical characteristics of claimed "interface means," such as specific format of recorded data or mechanism for accessing data, are important to invention, since plaintiff has provided some evidence of structural similarities between floppy disk drive and tape cassette transport, and there is at least issue of fact as to whether physical differences between them are substantial, and since plaintiff has also supplied evidence that one of ordinary skill in art would have recognized interchangeability of floppy disk drive and tape cassette transport for per-  
forming transferring and recording functions in claimed invention.

Particular patents — General and me-  
chanical — Machine tools

4,477,754, Roch, Wiles, and Hadley, interactive machining system, summary

EXHIBIT

f

judgment of non-infringement affirmed in part and vacated in part.

Appeal from the U.S. District Court for the Eastern District of Virginia, Brinkema, J.

Action by IMS Technology Inc. against Haas Automation Inc. and Gene Francis Haas for patent infringement. Plaintiff appeals from summary judgment of non-infringement, and defendants cross-appeal, challenging district court's construction of certain claim limitations. Affirmed in part, vacated in part, and remanded.

Robert P. Greenspoon, Raymond P. Niro, Robert A. Vitale Jr., John C. Janka, and Arthur A. Gasey, of Niro, Scavone, Haller & Niro, Chicago, Ill., for plaintiff-appellant.

Theodore A. Pianko and Syed A. Hasan, of Christie, Parker & Hale, Pasadena, Calif., for defendants-cross appellants.

Before Mayer, chief judge, and Michel and Plager, circuit judges.

Plager, J.

IMS Technology, Inc. ("IMS") appeals from the decision of the United States District Court for the Eastern District of Virginia. The district court granted summary judgment of noninfringement of U.S. Patent No. 4,477,754 ("the '754 patent") against IMS and in favor of Haas Automation, Inc. and Gene Francis Haas (collectively "Haas"). See *IMS Tech., Inc. v. Haas Automation, Inc.*, No. 98-143-A (E.D. Va. Oct. 2, 1998) (order). IMS argues on appeal that the district court erred in its claim construction and in its infringement analysis. Haas cross-appeals the district court's construction of certain claim limitations. Because the district court erred in its claim construction and infringement analysis and because, under a proper claim construction, there remain genuine issues of material fact concerning infringement with respect to some of the accused devices, we affirm in part, vacate in part, and remand.

#### BACKGROUND

IMS is the assignee of the '754 patent, which was originally assigned to Hurco Companies, Inc. ("Hurco"), a manufacturer of machine tools and machine tool controls. IMS is a wholly owned subsidiary of Hurco,

formed to license the '754 patent. Hurco assigned its rights in the '754 patent to IMS in 1995.

The '754 patent, which contains both apparatus and method claims, originally issued on October 16, 1984. After discovering prior art during prosecution of Japanese patent applications corresponding to the '754 patent, Hurco initiated a reexamination proceeding before the United States Patent and Trademark Office ("PTO"). In the reexamination, claim 1, an apparatus claim, and claim 11, a method claim, both at issue in the instant case, were allowed without amendment. One limitation of claim 7, an apparatus claim also at issue in this case, was substantively amended. The PTO issued a reexamination certificate on March 21, 1995.

The '754 patent relates generally to a control for a machine tool, such as a milling machine, which is used to cut or remove material from an object, referred to as a workpiece, through a machining operation. The type of control at issue is a numerical control ("NC"), which runs a program containing a series of numerical instructions and converts the instructions to electrical control signals. These control signals are applied to, for example, servo motors that control the movement of the machine tool along x, y, and z axes. Typically, a table holding the workpiece moves in the x (left and right) and y (fore and aft) directions, and a spindle holding a tool moves in the z (up and down) direction.

Before invention of the control claimed in the '754 patent, a programmer created a control program using a standard part programming language such as EIA Standard RS-274-D, which comprises a series of standard codes commonly referred to as G-codes and M-codes. The programmer, usually not the operator of the machine tool, typically worked in a location remote from the machine tool. The programmer created a program by looking at a blueprint of the object to be machined, determining the series of machine tool operations (e.g., movements and cuts) required to make the object, and consulting a handbook of G- and M-codes corresponding to the operations. The completed code was reproduced on a punched paper tape. The machine tool operator fed the punch tape into the machine tool, which executed the program by converting the G- and M-codes into binary code, which was translated into electrical control signals. The coding process was cumbersome and time-consuming.

The invention claimed in the '754 patent permits interactive programming of the ma-



nse the '754 patent. Hurco  
hts in the '754 patent to IMS

ent, which contains both ap-  
thod claims, originally issued  
1984. After discovering prior  
secution of Japanese patent  
rresponding to the '754 pat-  
tiated a reexamination pro-  
the United States Patent and  
fice ("PTO"). In the reexa-  
1, an apparatus claim, and  
hod claim, both at issue in the  
ere allowed without amend-  
ation of claim 7, an appa-  
at issue in this case, was  
mended. The PTO issued a  
certificate on March 21,

tent relates generally to a  
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is used to cut or remove  
an object, referred to as a  
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ntrol-at issue is a numerical  
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pically, a table holding the  
s in the x (left and right) and  
t) directions; and a spindle  
moves in the z (up and down)

tion of the control claimed in  
it, a programmer created a  
m using a standard part pro-  
guage such as EIA Standard  
ch comprises a series of stand-  
monly referred to as G-codes  
he programmer, usually not  
the machine tool, typically  
location remote from the ma-  
programmer created a pro-  
at blueprint of the object  
determining the series of  
ations (e.g., movements  
make the object, and  
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machine tool, which  
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'754 patent  
of the ma-

chine tool on the machine shop floor. The  
machine tool operator himself creates a pro-  
gram by using a keyboard to respond to  
nested inquiries displayed on a CRT screen.  
See '754 patent, col. 5, ll. 52-55; col. 6, ll.  
4-10. In general, the program contains data  
blocks, each of which corresponds to one  
operational step of the machine tool. When  
the machine tool operator selects an oper-  
ation, the control system may prompt him  
for additional parameters to be included in  
the data block for that operational step. For  
example, if the operator selects a "mill"  
operation, the system will prompt him for the  
selection of dimensional parameters, e.g., the  
coordinates for the start and end positions of  
the operation.

While the operator is creating a program,  
the program is stored in alterable memory  
(e.g., random access memory ("RAM")). In  
the embodiment disclosed in the written de-  
scription of the '754 patent, a program may  
be stored permanently on a tape cassette by  
means of a tape cassette transport included  
in the control. See *id.* at col. 6, ll. 49-52. The  
written description of the '754 patent does  
not specify that programs are stored in any  
particular storage format. A program pre-  
viously stored on a tape cassette can be read  
into alterable memory. See *id.* at col. 6, ll.  
54-58. A microprocessor executes the pro-  
gram by using the information in the data  
blocks to produce control signals for direct-  
ing the operation of the machine tool. See *id.*  
at col. 11, l. 16-col. 12, l. 7.

Haas is a corporation which manufactures  
and sells machine tools with numerical con-  
trols. The accused Haas controls also provide  
interactive programming capability of ma-  
chine tools on the machine shop floor. Some  
Haas controls have a floppy disk drive for  
storing programs. Others have only an  
RS-232 data port which can be connected to  
a storage device, such as a personal comput-  
er, for storing programs in ASCII format.  
Haas controls use programming systems  
known as Quickcode and Conversational  
Quickcode that assist the machine tool oper-  
ator in creating a G- and M-code program.  
In Quickcode, the operator views a split  
screen. On the right side of the screen, the  
operator sees a group window that includes a  
compressed list of short descriptions of  
G-code operations. By rotating a jog handle  
clockwise, the operator navigates through  
the groups. When the operator finds the  
desired group, he turns the jog handle coun-  
terclockwise to see additional operations,  
called items. The operator selects an item,  
and the corresponding G-code appears on the  
left side of the window. The operator can

then edit the G-code to change parameter  
values.

In Conversational Quickcode, the opera-  
tor can program questions to solicit values  
corresponding to G-code. After the answers  
to such questions are placed in the G-code on  
the screen, the operator can edit the G-code,  
as described above, with respect to  
Quickcode.

The Haas controls store programs in G-  
and M-code format. During execution of  
programs, the Haas controls translate  
G-code into a binary format, which is con-  
verted into electrical signals delivered to the  
machine tool for directing its operation.

IMS filed suit against Haas alleging that  
Haas infringes at least apparatus claims 1  
and 7 of the '754 patent and induces in-  
fringement and contributes to infringement  
of at least apparatus claims 1 and 7 and  
method claim 11 of the '754 patent. Those  
claims read as follows:

1. A programmable microcomputer con-  
trol apparatus for controlling the relative  
motion between a tool and a workpiece  
comprising:

indicator means for providing an output  
digital signals indicative of the relative  
position between the tool and the  
workpiece;

an alterable memory operable to retain a  
control program and control parameters;  
a microprocessor unit coupled to the out-  
put of the indicator means and to the  
memory and operable to produce control  
signals dependent upon said indicator  
means output and said control parameters  
according to said control program;

control means for directing said control  
signals from the microprocessor unit to  
appropriate motion-providing means;

interface means for transferring a control  
program and control parameters from an  
external medium into said alterable mem-  
ory and for recording the control param-  
eter contents of said memory onto an ex-  
ternal medium;

data entry means for loading control pa-  
rameters into said memory through exter-  
nally accessible data inputs independently  
of said interface means; and

display means for displaying control pa-  
rameters, said control program being oper-  
able to display control parameter inquiries  
on the display means, whereby an operator  
may load control parameters into said  
memory through said data entry means in  
response to the inquiries, said apparatus  
including means to sequentially display  
data block inquiries and to display, in  
response to the loading of certain control

parameters into said memory relating to the *data block* inquiries, separate displays of additional control parameter inquiries relating to information used in the *data block* which was the subject of the previous inquiry, whereby the sequential display of inquiries and direct loading of control parameters as to an operation can be used to make the use of the device simpler and more responsive to the operator.

7: A programmable microcomputer *control apparatus* for controlling the relative motion between a tool and a workpiece comprising:

*indicator means* for providing at an output digital signals indicative of the relative position between the tool and the workpiece;

an alterable memory operable to retain a control program and control parameters;

a processor unit coupled to the output of the indicator means and to the memory and operable to produce control signals dependent upon said indicator means output and said control parameters according to said control program, said control signals including programmed rate signals for controlling the rate of relative motion between the tool and the workpiece;

control means for directing said control signals from the processor unit to appropriate motion-providing means;

*interface means* for transferring a control program and control parameters from an external medium into said alterable memory and for recording the control parameter contents of said memory onto an external medium;

data entry means for loading control parameters into said memory through externally accessible data inputs independently of said interface means; and

*feed rate adjust means* externally and manually settable independent of said control parameters, said feed rate adjust means coupled to said processor unit, said processor unit recalculating said rate signals dependent on said feed rate adjust means to vary the rate of relative motion between the tool and the workpiece.

11: A method for automatically and interactively performing machining operations on a workpiece comprising the steps of: entering the mode type and dimensional parameters for a machining operation into a microcomputer memory as a *data block*; repeating said entering step for *data blocks* for any further operations and di-

mensions as necessary to complete processing of the workpiece; and executing a microcomputer program utilizing said *data blocks* to direct a machine to perform said operations on a workpiece;

displaying on screen sequentially for observation and response by the operator, a plurality of inquiries regarding mode and dimensional parameters for individual *data blocks*; and

as to at least some of the individual *data blocks*, utilizing operator response to initiate and implement subsequent display of additional inquiries for observation and response by the operator to further define the parameters of the *data block* as to an operation.

'754 patent, col. 14, l. 41 - col. 15, l. 13; col. 15, ll. 37-68; col. 16, l. 55 - col. 17, l. 8 (emphasis added).

Upon Haas's motion for claim construction, and after receiving extensive briefing from both parties and conducting a limited hearing on the issue of claim construction, the district court issued a memorandum opinion and order in which it construed many of the terms in the claims of the '754 patent. See *IMS Tech., Inc. v. Haas Automation, Inc.*, No. CA-97-1043-A (E.D. Va. Sept. 23, 1998). The district court then held a hearing on Haas's motion for summary judgment of noninfringement on October 2, 1998. At that hearing, the district court judge orally amended the claim construction relating to the term "data block." Based on the claim construction, the district court granted Haas's motion for summary judgment of noninfringement.

IMS appeals aspects of the district court's claim construction and its grant of Haas's motion for summary judgment. IMS's appeal focuses on the meaning of two terms: "interface means" and "data block." The district court construed the "interface means" limitation, found in claims 1 and 7, as a means-plus-function limitation in accordance with 35 U.S.C. § 112, ¶ 6 (1994), and determined that the corresponding structure in the written description includes a tape cassette transport. Based on this claim construction, the district court concluded that the Haas controls do not literally infringe claims 1 and 7 as a matter of law because Haas's floppy disk drive and the tape cassette transport disclosed in the '457 patent are not equivalent structures. The district court also found that Haas's floppy disk drive does not as a matter of law satisfy the "interface means" limitation under the doctrine of equivalents.

ensions as necessary to complete processing of the workpiece; and

executing a microcomputer program utilizing said *data blocks* to direct a machine perform said operations on a workpiece;

displaying on screen sequentially for observation and response by the operator, a plurality of inquiries regarding mode and dimensional parameters for individual *data blocks*; and

to at least some of the individual *data blocks*, utilizing operator response to initiate and implement subsequent display of additional inquiries for observation and response by the operator to further define parameters of the *data block* as to an operation.

patent col. 14, l. 41 - col. 15, l. 13; col. 17, l. 37-68; col. 16, l. 55 - col. 17, l. 8 (basis added).

In Haas's motion for claim construction and after receiving extensive briefing from both parties and conducting a limited hearing on the issue of claim construction, the district court issued a memorandum opinion and order in which it construed the terms in the claims of the '754 patent. See *IMS Tech., Inc. v. Haas Automation, Inc.*, No. CA-97-1043-A (E.D. Va., 1998). The district court then held that Haas's motion for summary judgment of noninfringement on October 2, 1998, was granted. In its opinion, the district court amended the claim construction of the term "data block." Based on the district court's construction, the district court granted Haas's motion for summary judgment of noninfringement.

In its opinion, the district court's construction of the term "data block" and its grant of Haas's motion for summary judgment of noninfringement. IMS's appeal is based on the meaning of two terms: "data block" and "data block." The district court construed the "interface" limitation found in claims 1 and 7, as a "data block" limitation in accordance with 35 U.S.C. § 112, ¶ 6 (1994), that the corresponding structure in the written description includes a floppy disk drive. Based on this claim construction, the district court concluded that Haas's controls do not literally infringe the "data block" limitation. As a matter of law, the district court concluded that Haas's floppy disk drive and the "data block" limitation disclosed in the '457 patent are not equivalent structures. The district court concluded that Haas's floppy disk drive and the "data block" limitation under the

Regarding the term "data block," found in claims 1 and 11, the district court stated in its original claim construction order that "data block" was limited to the specific variables and sequence of inquiries set forth in the written description of the '457 patent. At the summary judgment hearing, the district court added that the term "data block" does not encompass the use of G- and M-codes. The district court concluded that, because the Haas controls do not use the same variables and sequence of inquiries as those disclosed in the written description and rely on the use of G- and M-codes, Haas does not infringe claim 11 either literally or under the doctrine of equivalents.

IMS also appeals the district court's claim construction limiting the scope of claims 1 and 7 to "a control system for machine tools rather than an entire machine tool apparatus."

In its cross-appeal, Haas argues that, if the district court's grant of summary judgment is vacated, we should correct other errors in the district court's claim construction. Specifically, Haas appeals the district court's conclusion that the "indicator means" limitation in claims 1 and 7 covers systems that measure the location of the workpiece and the tool from a fixed and unalterable point. Haas also appeals the district court's construction of the "feed rate adjust means" limitation in claim 7, arguing that the district court construed the original claim language instead of the language as amended during reexamination.

## DISCUSSION

In reviewing a district court's grant of summary judgment, we must make an independent determination as to whether the standards for summary judgment have been met. See *Conroy v. Reebok Int'l, Ltd.*, 14 F.3d 1570, 1575, 29 USPQ2d 1373, 1377 (1994); *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1560, 19 USPQ2d 1111, 1114 (Fed. Cir. 1991); *C.R. Bard, Inc. v. Advanced Cardiovascular Sys., Inc.*, 911 F.2d 670, 673, 15 USPQ2d 1540, 1542-43 (Fed. Cir. 1990). We view the evidence in a light most favorable to the non-movant, and draw all reasonable inferences in its favor. See *SRI Int'l v. Matsushita Elec. Corp.*, 775 F.2d 1107, 1116, 227 USPQ 577, 581 (Fed. Cir. 1985) (en banc). A motion for summary judgment is properly granted if there is no genuine issue as to any material fact and the moving party is entitled to judgment as a matter of law. See Fed. R. Civ. P. 56(c).

An infringement analysis requires two steps: (1) claim construction to determine

the scope and meaning of the asserted claims, and (2) a comparison of the properly construed claims with the allegedly infringing device or method to determine whether the device or method embodies every limitation of the claims. See *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1454, 46 USPQ2d 1169, 1172 (Fed. Cir. 1998) (en banc). Claim construction is a matter of law over which we exercise independent review. See *id.* at 1456, 46 USPQ2d at 1174. Whether an accused device or method infringes a claim either literally or under the doctrine of equivalents is a question of fact. See *Insituform Techs., Inc. v. Cat Contracting, Inc.*, 161 F.3d 688, 692, 48 USPQ2d 1610, 1614 (Fed. Cir. 1998). Thus, on appeal from a grant of summary judgment of noninfringement, we must determine whether, after resolving reasonable factual inferences in favor of the patentee, the district court correctly concluded that no reasonable jury could find infringement. See *Voice Techs. Group, Inc. v. VMC Sys., Inc.*, 164 F.3d 605, 612, 49 USPQ2d 1333, 1337 (Fed. Cir. 1999).

An infringement analysis of a claim with limitations drafted pursuant to 35 U.S.C. § 112, ¶ 6 (1994), involves the same two steps—claim construction and a comparison of the accused device or method with the properly construed claims. Limitations contemplated by § 112, ¶ 6, often referred to as means-plus-function or step-plus-function limitations, recite a specified function to be performed rather than the structure, material, or acts for performing that function. Such limitations are "construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof." 35 U.S.C. § 112, ¶ 6 (1994). Claim construction of a § 112, ¶ 6 limitation includes identifying the claimed function and determining the corresponding structure or act disclosed in the specification, both of which are questions of law that this court reviews independently. See *Chiuminatta Concrete Concepts, Inc. v. Cardinal Indus., Inc.*, 145 F.3d 1303, 1308, 46 USPQ2d 1752, 1755-56 (Fed. Cir. 1998).

For literal infringement of a § 112, ¶ 6 limitation, the second step of an infringement analysis begins with determining whether the accused device or method performs an identical function to the one recited in the claim. See *Mas-Hamilton Group v. LaGard, Inc.*, 156 F.3d 1206, 1211-12, 48 USPQ2d 1010, 1015 (Fed. Cir. 1998). If the identical function is performed, the next step is to determine whether the accused device uses the same structure, materials, or acts found in the specification, or their equivalents. See *id.* at 1212, 48 USPQ2d at 1015.



Whether an accused device or method infringes a claim with a § 112, ¶ 6 limitation, i.e., whether it performs the identical function with the same structure, materials, or acts described in the specification or an equivalent thereof, is a question of fact. See *Odetics, Inc. v. Storage Tech. Corp.*, 185 F.3d 1259, 1268-69, 51 USPQ2d 1225, 1230-31 (Fed. Cir. 1999) (citing *Palumbo v. Don-Joy Co.*, 762 F.2d 969, 975, 226 USPQ 5, 8 (Fed. Cir. 1985), and indicating that the holding in *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 976-79, 34 USPQ2d 1321, 1327-29 (Fed. Cir. 1995), that claim construction is a question of law did not affect the holding in *Palumbo* that whether an accused device is a § 112, ¶ 6 equivalent is a question of fact). Thus, in order to uphold a summary judgment of noninfringement, we must conclude that no reasonable jury could have found otherwise.

#### A. Claim Construction

IMS argues that several aspects of the district court's claim construction are incorrect. We will examine each issue in turn using our standard canons of claim construction.

##### 1. "Interface means" in claims 1 and 7

We agree with the district court's ruling, unchallenged by the parties, that the limitation "interface means for transferring a control program and control parameters from an external medium into said alterable memory and for recording the control parameter contents of said memory onto an external medium" in claims 1 and 7 is subject to § 112, ¶ 6.<sup>1</sup> IMS asserts that the district court erred in its construction of the limitation by identifying the tape cassette transport as the relevant corresponding structure found in the specification. IMS further argues that, even if the tape cassette transport is the corresponding structure, the district court erred by concluding as a matter of law that the floppy disk drive in the accused Haas controls cannot be equivalent to the disclosed tape cassette transport.

The "interface means" limitation recites two functions, i.e., "recording" a control program and control parameters from an alterable memory onto an external medium,

and "transferring" a control program and control parameters from the external medium into alterable memory. IMS contends that the corresponding structure in the specification, disclosed in the written description, is a tape cassette peripheral interface adapter ("PIA") because that is the only structure that performs the "transferring" function. In making its argument, however, IMS virtually ignores the "recording" function and misapplies the meaning of "transferring" in the context of the claim.

The claimed interface means records data from the alterable memory to an external medium and transfers data from the external medium to the alterable memory. The external medium disclosed in the written description is a tape cassette, and the alterable memory disclosed is a RAM. Thus, the structure corresponding to the "recording" and "transferring" functions must record data residing in the RAM onto the tape cassette and transfer data from the tape cassette to the RAM. IMS correctly states that the written description associates the PIA with these functions: "PIA 77 provides the interfacing [sic] with a tape cassette which is utilized to load RAM 36. Also, a subsequently inserted cassette may be utilized to record stored RAM program data through PIA 77." '754 patent, col. 4, ll. 46-48. The written description, however, also associates a tape cassette transport with the functions of transferring data from the tape cassette to the RAM and recording data from the RAM onto the tape cassette: "A tape cassette transport apparatus is shown generally at 225 for receiving a magnetic tape cassette operable to read or write data to or from the RAM memory. With mode switch 203 in the tape auto mode, the data block entries may be recorded onto a tape cassette." '754 patent, col. 6, ll. 49-52. In view of both of these passages, it is apparent that both the PIA and the tape cassette transport are necessary for transferring data from the tape cassette to the RAM and recording data from the RAM onto the tape cassette.

IMS argues that the "transferring" function is only an "interfacing" function between the RAM and the tape cassette transport. But the claims require the interface means to transfer data to the RAM from an external medium, i.e., a tape cassette, not just from the tape cassette transport. The disclosed PIA performs only part of the "transferring" function, i.e., transferring from the tape cassette transport to the RAM. The tape cassette transport itself transfers data from the tape cassette to the PIA, and therefore both the PIA and the tape cassette transport are part of the dis-

<sup>1</sup> That the term "means" is used in a limitation does not necessarily mean that the limitation is properly a § 112, ¶ 6 limitation. See, e.g., *York Prods., Inc. v. Central Tractor Farm & Family Ctr.*, 99 F.3d 1568, 1574, 40 USPQ2d 1619, 1623 (Fed. Cir. 1996).

control program and on the external memory. IMS contends structure in the specified written description, a general interface adaptation is the only structure "transferring" function. In however, IMS virtualizing" function and mis-"transferring" in the

ice means records data memory to an external data from the external memory. The external in the written descriptive, and the alterable RAM. Thus, the structure of the "recording" and ions must record data onto the tape cassette in the tape cassette directly states that the associates the PIA with A-77 provides the in-tape cassette which is 136. Also, a subsequent may be utilized to record an data through PIA 4-11, 46-48. The written also associates a tape with the functions of the tape cassette to the data from the RAM, etc. A tape cassette is shown generally at magnetic tape cassette the data to or from the mode switch 203 in the data block entries may cassette 754 pattern of both of these that both the PIA support are necessary in the tape cassette the data from the

transferring" function. The function between the cassette transport and the interface RAM from an cassette, not transport. The part of the transferring transport to the transport itself cassette to the and the of the dis-

closed structure corresponding to the "transferring" function of the interface means.

Similarly, the interface means must record data from the RAM onto the tape cassette. The tape cassette transport receives data from the RAM via the PIA and completes the recording function by recording data onto the tape cassette. The PIA and the tape cassette transport together perform this function and thus are both part of the disclosed structure corresponding to the claimed interface means.

IMS also argues that, under the doctrine of claim differentiation, the interface means cannot be limited to a means for "reading" and "writing" because claim 2, which depends from claim 1, places that additional limitation on the interface means: "said interface means includes means for reading from and writing onto a magnetic stored information input." IMS further argues that the "interface means" cannot be limited to a tape cassette transport because claim 3, which depends from claim 2, specifically claims a tape cassette transport as the means for reading and writing.

[1] We reject IMS's argument that the doctrine of claim differentiation requires that the corresponding structure of the interface means of claim 1 be limited to the disclosed PIA. The scope of claim 3 is clearly narrower than that of claim 1 because claim 3 covers only a tape cassette transport, whereas claim 1 covers a tape cassette transport and its equivalents in accordance with § 112, ¶ 6. See *Laitram Corp. v. Rexnord, Inc.*, 939 F.2d 1533, 1538, 19 USPQ2d 1367, 1371 (Fed. Cir. 1991) (holding that claim differentiation is maintained when the disclosed structure corresponding to an independent § 112, ¶ 6 claim is recited in a dependent claim). The scope of claim 2 is also narrower than that of claim 1, at least because it limits the external medium to a magnetic stored information input.

Furthermore, the proper claim construction does not give the same meaning to “recording” in claim 1 and to “writing” in claim 2 as IMS contends. Rather, the “reading” and “writing” functions in claim 2 are the parts of the “transferring” and “recording” functions of the “interface means” that are performed by the disclosed tape cassette transport, rather than the PIA. In any event, it is permissible for claim 1 and claim 2 to have similar scope after each is correctly construed in light of the structures disclosed in the written description, because the judicially-created doctrine of claim differentiation cannot override the statutory mandate of § 112, ¶ 6. *See id.* (noting that claim differentiation is a guide, not a rigid rule).

In sum, we conclude that the proper construction of the "interface means" limitation covers the disclosed structure, which includes the PIA and tape cassette transport, and its equivalents in accordance with § 112, ¶ 6. IMS argues, alternatively, that, even under this claim construction, the district court erred by finding that, as a matter of law, Haas's floppy disk drive could not be an equivalent to the disclosed tape cassette transport. We shall address this issue *infra* in connection with our infringement analysis.

2. "Data block" in claims 1 and 11

The district court construed the term "data block," which appears in several steps of method claim 1-1 and in the display means limitation of claim 1, as limited to the specific set of variables disclosed in the written description and the disclosed sequence of inquiries regarding those variables. The district court also held that a "data block" as properly construed, cannot include or refer to any instructions written in a known part programming language, such as G- and M-codes. We agree with IMS that the district court erred in construing the term "data block" so narrowly.

The parties agree that the claim limitations in which the term appears are subject to § 112, ¶ 6.<sup>1</sup> They dispute, however, whether the meaning of the term “data block” itself is affected by § 112, ¶ 6. Haas contends that the district court correctly held that § 112, ¶ 6 applies to limit the meaning of the term “data block” to the variables and sequence disclosed in the written description. We hold that this is an erroneous application of § 112, ¶ 6.

[2] Section 112, ¶ 6 does not limit all terms in a means-plus-function or step-plus-function clause to what is disclosed in the written description and equivalents thereof. § 112, ¶ 6 applies only to interpretation of the means or step that performs a recited function when a claim recites insufficient structure or acts for performing the function. See *O.I. Corp. v. Tekmar, Co.*, 115 F.3d 1576, 1581, 42 USPQ2d 1777, 1780 (Fed. Cir. 1997). In claim 1, the display means includes a “means to sequentially display data block inquiries.” The recited function consists of sequentially displaying data block inquiries, and the claim recites no structure supporting the means for performing that function. There-

<sup>2</sup> It is unnecessary for us to consider whether the parties are correct in their assertion that claim 11 includes limitations subject to § 112, ¶ 6, and therefore we offer no opinion as to that conclusion.

fore, in accordance with § 112, ¶ 6, the means is construed to cover the disclosed structure, i.e., a CRT, and its equivalents. The "data block" is not the means that causes the sequential display and is therefore not subject to construction under § 112, ¶ 6. *See id.* (holding the term "passage" within the clause "means for passing the analyte slug through a passage" is not subject to § 112, ¶ 6). Similarly, in claim 11, assuming that the several limitations in which the term "data block" appears are subject to § 112, ¶ 6, the "data block" is not part of the steps that perform the recited functions. We therefore must construe the term "data block" according to our standard claim construction methodology without application of § 112, ¶ 6. *See id.*

To construe the term "data block," we look first to the claim language, the written description, and the prosecution history. *See Zelinski v. Brunswick Corp.*, 185 F.3d 1311, 1315, 51 USPQ2d 1590, 1592-93 (Fed. Cir. 1999). The ordinary and customary meaning of "data block" in the context of programmable machine tools is a computer data structure containing the information needed by a machine tool to perform a single machining operation. Haas contends that the ordinary meaning does not apply because the patentee gave the term "data block" a special meaning by describing the preferred embodiment in the patent as follows: "The sequence of inquiries on the CRT screen for a data block follows the sequence: data block number, machine, mode, control mode, X dimension, Y dimension, Z dimension, feed rate, pack rate and tool number." '754 patent, col. 6, ll. 4-7. We find nothing in the written description, however, that indicates this is the patentee's specialized definition of "data block." Rather, the written description merely describes the preferred embodiment, and to limit "data block" to the sequence of variables disclosed would be impermissibly read a particular embodiment into the claim. *See Comark Communications, Inc. v. Harris Corp.*, 156 F.3d 1182, 1186-87, 48 USPQ2d 1001, 1005 (Fed. Cir. 1998).

Haas also argues that the following statement, made by the applicant during prosecution of the '754 patent, limits the meaning of the term "data block" to the specific variables and display sequence set forth in the written description: "particular attention should be paid to the term 'data block' as used in the specification and claims when considering the scope of these claims." Joint App. at 319. This statement alone cannot narrow the scope of the claims. Haas contends further that a brochure submitted to the Examiner by the applicant limits the

term "data block" to the specific variables and display sequence disclosed in the written description. This argument is also without merit, for it is clear from the prosecution history that the brochure was intended only to assist the Examiner in understanding the preferred embodiment. In sum, we hold that nothing in the written description or prosecution history is sufficient to overcome the ordinary meaning and to require that the meaning of "data block" be limited to the specific variables and display sequence disclosed in the written description as the preferred embodiment.

Another issue raised by Haas is whether other statements made during the prosecution and reexamination of the '754 patent limit a "data block" to a format that in no way relies on G- and M-codes. In distinguishing over a prior art reference, the applicant stated that the claims were "intended to focus upon a novel interactive system in which the operator was sequentially asked questions and via the display the operator in response simply answered the question rather than have to worry about how to program the device." Joint App. at 319. The applicant made two more similar statements in responding to later office actions. IMS argues that these statements were intended to convey the interactive nature of creating a parts program using the claimed invention and do not disclaim the use of prior art programming languages such as G- and M-codes so long as a program is created interactively according to the claims.

During reexamination, the patentee distinguished several other prior art references by emphasizing the interactive programming technique of the invention, including the use of nested inquiries to prompt the user to enter additional information based on the user's response to a previous inquiry. No statements regarding the prior art clearly disclaim the use of G- and M-codes as Haas contends. In the last response to the PTO during reexamination, the patentee contrasted the invention with the cumbersome prior art programming process:

The present invention utilizes an interactive display which operates in a question and answer format without resorting to the M and G codes of the machine tool. . . . The interactive processing of the data blocks enables the machine tool operator to perform the tasks of both the programmer and machinist on the shop floor.

Joint App. at 932.

We agree with IMS that this statement, taken in context, as well as the other statements made during prosecution and reexamination, do not disclaim the use of G- and



lock" to the specific variables sequence disclosed in the written description. This argument is also without merit. The prosecution history of the '754 patent is clear from the prosecution history. The brochure was intended only to inform the examiner in understanding the invention. In sum, we hold that the written description or prosecution history is sufficient to overcome the prior art and to require that the "data block" be limited to the data and display sequence disclosed in the written description as the prior art.

The issue raised by Haas is whether the limitations made during the prosecution of the '754 patent are limited to a format that in no way is G- and M-codes. In distinguishing prior art reference, the applicant claims were "intended to be a novel interactive system in which the operator was sequentially asked to answer the question rather than to worry about how to program the machine." Joint App. at 319. The applicant made similar statements in related office actions. IMS argues that the statements were intended to convey the interactive nature of creating a part using the claimed invention and do not require the use of prior art programming languages such as G- and M-codes so long as the program is created interactively.

In the examination, the patentee distinguished the prior art references by claiming the interactive programming of the invention, including the use of inquiries to prompt the user to provide information based on the results of a previous inquiry. No limitation on the prior art clearly required the use of G- and M-codes as Haas claims. In its last response to the PTO, the patentee contrasted the invention with the cumbersome prior art process.

The invention utilizes an interactive machine tool that operates in a question and answer format without resorting to the use of the machine tool. . . . The processing of the data is done by the machine tool operator on the shop floor.

That this statement, as well as the other statements in the prosecution and reexamination, support the use of G- and

M-codes in the claimed invention. The purpose of the statements was to emphasize the interactive nature of the invention as an improvement over the prior art programming method in which a user had to create a program line-by-line using only G- and M-codes. Thus, the claimed invention does not require the creation of a G- and M-code program; at the same time, however, the invention does not preclude the creation of a G- and M-code program so long as it is created using the claimed interactive inquiry process.

Haas further argues, in support of its contention that a data block cannot be stored in G- and M-code format, that the written description never mentions the use of G- and M-codes. While it is true that the embodiment disclosed in the written description does not purport to store data blocks in G- and M-code format, the use of data blocks in the invention as claimed is independent of the storage format. The claimed invention is an apparatus and method for interactively creating a program for controlling the machine tool. That program contains data blocks, each of which, according to the customary meaning of the term, includes the information needed by a machine tool to perform one machining operation. It is irrelevant to the claimed invention whether a data block is stored as a line of G- and M-code, in a binary format, or in any other format.

In sum, we conclude that the proper construction of the term "data block" is a computer data structure containing the information needed by a machine tool to perform a single machining operation. As properly construed, a "data block" is not limited to the specific set of variables and display sequence disclosed in the written description and does not preclude the use of G- and M-codes.

### 3. "Control apparatus" in claims 1 and 7

IMS contends that the district court erred when, based on the preambles of claims 1 and 7, it limited those claims to a "control system for machine tools rather than an entire machine tool apparatus." To the extent that the district court's claim interpretation precludes a finding of infringement by a machine tool apparatus that includes the claimed control-related limitations, we agree that the district court improperly limited the claims.

[3] "[A] claim preamble has the import that the claim as a whole suggests for it." *Bell Communications Research, Inc. v. Vita-link Communications Corp.*, 55 F.3d 615, 620; 34 USPQ2d 1816, 1820 (Fed. Cir. 1995). If the preamble adds no limitations to

those in the body of the claim, the preamble is not itself a claim limitation and is irrelevant to proper construction of the claim. See *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305, 51 USPQ2d 1161, 1165-66 (Fed. Cir. 1999). That is the case here. The phrase "control apparatus" in the preamble merely gives a descriptive name to the set of limitations in the body of the claim that completely set forth the invention. Its use does not limit the claims, as Haas contends, to a control apparatus that is separate from the machine tool. The claim is infringed by any apparatus encompassing all of the limitations in the body of the claim. Such an infringing apparatus may be a machine tool apparatus that includes the claimed control features or a control apparatus that is separate from and communicates with a machine tool apparatus.

The prosecution history is consistent with this interpretation. In a restriction requirement, the PTO recognized that the claimed invention, a machine tool control, was part of a machine tool. In sum, the applicant's choice to elect claims directed to machine tool control rather than machine control structure does not limit the scope of the claims to a control apparatus that is separate from the machine tool itself.

### B. Infringement Analysis

In light of the proper claim construction, the key infringement issue before us is whether the accused Haas systems contain the claimed "interface means." As noted, the district court based its finding of noninfringement of claims 1 and 7 on its conclusion that the Haas floppy disk drive is not equivalent, under either § 112, ¶ 6 or the doctrine of equivalents, to the disclosed tape cassette transport.

To determine whether the Haas systems literally contain the "interface means" of claims 1 and 7, it is necessary to first determine whether the accused devices perform the identical functions recited in the claims—recording data from memory onto an external medium and transferring data from the external medium to memory. There is no dispute that the Haas systems with a floppy disk drive perform these functions. Since the Haas systems do not contain the same structure as the disclosed PIA and tape cassette transport, the only question is whether the Haas systems contain a structure that is an equivalent of the disclosed structure. Assuming that the Haas systems include an interface device equivalent to the PIA, a fact uncontested by Haas, the determinative issue under § 112, ¶ 6 is whether the

floppy disk drive in the Haas system is equivalent to the disclosed tape cassette transport.

This court has on several occasions compared statutory equivalence under § 112, ¶ 6 and the judicial doctrine of equivalents. See, e.g., *Odetics, Inc. v. Storage Tech. Corp.*, 185 F.3d 1259, 1267, 51 USPQ2d 1225, 1229-30 (Fed. Cir. 1999); *Al-Site Corp. v. VSI Int'l, Inc.*, 174 F.3d 1308, 1319-21, 50 USPQ2d 1161, 1167-68 (Fed. Cir. 1999); *Chiuminatta Concrete Concepts, Inc. v. Cardinal Indus., Inc.*, 145 F.3d 1303, 1310, 46 USPQ2d 1752, 1757-58 (Fed. Cir. 1998); *Cybor Corp. v. FAS Techs.*, 138 F.3d 1448, 1467, 46 USPQ2d 1169, 1184 (Fed. Cir. 1998) (en banc) (Mayer, C.J., concurring); *Alplex Computer Corp. v. Nintendo Co.*, 102 F.3d 1214, 1222, 40 USPQ2d 1667, 1673-74 (Fed. Cir. 1996); *Valmont Indus., Inc. v. Reinke Mfg. Co.*, 983 F.2d 1039, 1042-44, 25 USPQ2d 1451, 1453-55 (Fed. Cir. 1993). While acknowledging that there are differences between § 112, ¶ 6 and the doctrine of equivalents, this court on several occasions has indicated that the tests for equivalence under § 112, ¶ 6 and the doctrine of equivalents are "closely related," involving "similar analyses of insubstantiality of the differences." *Chiuminatta*, 145 F.3d at 1310, 46 USPQ2d at 1757-58; see also *Warner-Jenkinson Co. v. Hilton Davis Chem. Co.*, 520 U.S. 17, 28, 41 USPQ2d 1865, 1870 (1997) (stating that application of § 112, ¶ 6 "is an application of the doctrine of equivalents in a restrictive role"); *Valmont*, 983 F.2d at 1043, 25 USPQ2d at 1455 ("The word 'equivalent' in section 112 invokes the familiar concept of an insubstantial change which adds 'nothing of significance.'"). Thus, a reduced version of the well-known tripartite test for the doctrine of equivalents has been applied in the § 112, ¶ 6 context to determine if the differences are insubstantial, i.e., after determining that the accused device performs the identical function, as required by statute, whether it performs the function in substantially the same way to achieve substantially the same result. See *Odetics*, 185 F.3d at 1267, 51 USPQ2d at 1229-30; see also *Dawn Equip. Co. v. Kentucky Farms, Inc.*, 140 F.3d 1009, 1019-20, 46 USPQ2d 1109, 1116 (Fed. Cir. 1998) (Plager, J., additional views) (suggesting use of the tripartite test "to resolve the question of insubstantial changes" under § 112, ¶ 6). Evidence of known interchangeability between structure in the accused device and the disclosed structure has also been considered an important factor. See *Al-Site*, 174 F.3d at 1316, 50 USPQ2d at 1165; *Chiuminatta*, 145 F.3d at 1309, 46 USPQ2d at 1757 (citing *Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*,

339 U.S. 605, 609, 85 USPQ 328, 331 (1950)).

[4] In light of the similarity of the tests for equivalence under § 112, ¶ 6 and the doctrine of equivalents, the context of the invention should be considered when performing a § 112, ¶ 6 equivalence analysis just as it is in a doctrine of equivalents determination. See *Texas Instruments, Inc. v. ITC*, 805 F.2d 1558, 1563, 231 USPQ 833, 835 (Fed. Cir. 1986) ("It has long been recognized that the range of permissible equivalents depends upon the extent and nature of the invention..."); cf. *Warner-Jenkinson*, 520 U.S. at 40, 41 USPQ2d at 1875 (noting that in a doctrine of equivalents determination, "[a]n analysis of the role played by each element in the context of the specific patent claim will thus inform the inquiry as to whether a substitute element matches the function, way, and result of the claimed element, or whether the substitute element plays a role substantially different from the claimed element"). As a result, two structures that are equivalent in one environment may not be equivalent in another. More particularly, when in a claimed "means" limitation the disclosed physical structure is of little or no importance to the claimed invention, there may be a broader range of equivalent structures than if the physical characteristics of the structure are critical in performing the claimed function in the context of the claimed invention. Thus, a rigid comparison of physical structures in a vacuum may be inappropriate in a particular case. Indeed, the statute requires two structures to be equivalent, but it does not require them to be "structurally equivalent," i.e., it does not mandate an equivalency comparison that necessarily focuses heavily or exclusively on physical structure.

In some cases, an analysis of insubstantial differences in the context of the invention results in a finding of equivalence under § 112, ¶ 6 even though two structures arguably would not be considered equivalent structures in other contexts, e.g., if performing

The difference between "equivalent structures" and "structural equivalents" can be demonstrated with a simple example borrowed from the late Judge Rich. A claim includes part A, part B, and "means for securing parts A and B together in a fixed relationship." The written description discloses that parts A and B are made of wood and are secured together by nails. For purposes of the invention, it does not matter how parts A and B are secured; nails are not a critical part of the invention. A screw is not a nail, but for purposes of § 112, ¶ 6, it is equivalent structure in the context of the invention, though it is not the "structural equivalent" of a nail.



609, 85 USPQ 328, 331

the similarity of the tests for § 112, ¶ 6 and the doctrine of the context of the invention considered when performing a § 112, ¶ 6 equivalence determination. See *Ents. Inc. v. ITC*, 805 F.2d 1181, 53 USPQ2d 833, 835 (Fed. Cir. 1986), cert. denied, 480 U.S. 1019, 55 USPQ2d 1019 (1987). It has long been recognized that the § 112, ¶ 6 equivalence depends on the nature of the invention. See *Mer-Jenkinson*, 520 U.S. at 1875 (noting that in a § 112, ¶ 6 equivalence determination, "[a]n element played by each element in the specific patent claim will be an inquiry as to whether a structure matches the function, of the claimed element, or substitute element plays a role different from the claimed element, two structures that are in the same environment may not be equivalent. More particularly, the 'means' limitation of the claimed structure is of little or no relevance to the claimed invention, there is a range of equivalent structures having physical characteristics of the claimed structure critical in performing the function on in the context of the invention. Thus, a rigid comparison of structures in a vacuum may be in a particular case. Indeed, it requires two structures to be equivalent, i.e., it does not require them to be equivalent, i.e., it does not require a comparison that is heavily or exclusively on structure.

an analysis of insubstantial differences in the context of the invention. In determining equivalence under § 112, ¶ 6, two structures arguably considered equivalent structures in the context of the invention, e.g., if performing

between equivalent structures, the equivalence can be demonstrated by example borrowed from the prior art. For example, if a claim includes part A and B, and the prior art teaches securing parts A and B together by nails. The written description of the invention states that parts A and B are made of wood and are secured together by nails. For purposes of § 112, ¶ 6, it does not matter how the parts are secured together, as long as they are not a critical part of the invention. A nail, but not a screw, is not a critical part of the invention, though it is a part of the invention.

functions other than the claimed function. See *Odetics*, 185 F.3d at 1269-71, 51 USPQ2d at 1231-32 (reinstating jury verdict of infringement when there was evidence that a "bin array" with a cam and cam follower mechanism performed a rotary function in the same way as a "rotary means" with a gear mechanism by receiving force); *Al-Site*, 174 F.3d at 1315-17, 50 USPQ2d at 1164-65 (affirming jury verdict of infringement based on expert testimony of known interchangeability of glue and rivet as a "fastening means" on hanger tag for glasses). But see *Odetics*, 185 F.3d at 1277-79, 51 USPQ2d at 1237-38 (Lourie, J., dissenting) (criticizing majority for focusing exclusively on function and not on structure). In other cases, in which the specific physical features of the structure corresponding to the "means" limitation may have more relevance to the claimed invention, a finding of noninfringement results. See *Chiuminatta*, 145 F.3d at 1309-10; 46 USPQ2d at 1757 (finding wheels and skid plate not equivalent for supporting surface of concrete, particularly since there was no allegation that one skilled in the art recognized the interchangeability of structures for performing claimed function).

[5] Turning to the case at hand and the issue of whether Haas's floppy disk drive can be a § 112, ¶ 6 equivalent of the disclosed tape cassette transport, we consider the substantiality of their differences in the context of the claimed invention. The invention is directed to an apparatus that permits interactive programming of a machine tool. The transferring and recording functions of the claimed "interface means" merely provide a way of storing programs created using the inventive programming apparatus and process. This does not appear to be a case in which any physical characteristics of the interface means, such as the specific format of recorded data and the mechanism for accessing data, are important to the invention. IMS has provided some evidence of structural similarities between a floppy disk drive and a tape cassette transport, and, while there are admittedly physical differences, there is at least an issue of fact as to whether those differences are substantial in light of the role played by the "interface means" in the claimed invention. One way to address that question is to ask whether the structures perform the same function substantially the same way to achieve substantially the same result. IMS has also supplied evidence that one of ordinary skill in the art would have recognized the interchangeability of a floppy disk drive and a tape cassette transport for performing the transferring

and recording functions in the claimed invention. Such evidence should be considered in a § 112, ¶ 6 equivalence determination.

In light of the evidence presented by IMS regarding the insubstantiality of the differences between a floppy disk drive and a tape cassette transport in the context of the claimed invention, we conclude that there are genuine issues of material fact regarding literal infringement under § 112, ¶ 6 of claims 1 and 7. Furthermore, because of the similarities in analysis of equivalence under § 112, ¶ 6 and the doctrine of equivalents, there also remain genuine factual issues regarding infringement of claims 1 and 7 under the doctrine of equivalents. Accordingly, with respect to the Haas systems containing floppy disk drives, we vacate the grant of summary judgment of noninfringement of claims 1 and 7 and remand for further proceedings consistent with this opinion. On remand, the district court is instructed to apply the correct construction of the terms "data block" in claim 1 and "control apparatus" in claims 1 and 7, as discussed above.

Haas also manufactures and sells systems that include only an RS-232 port for connection to a storage device, but do not include the storage device itself. These systems do not perform the functions of transferring and recording data because there is no external medium. Therefore, the Haas RS-232 systems do not contain the claimed "interface means," and we affirm the district court's grant of summary judgment that these systems do not directly infringe claims 1 and 7, either literally or under the doctrine of equivalents. This holding does not, however, preclude a finding that Haas induces infringement or contributorily infringes if, for example, a Haas customer connects a Haas system to an external storage device. Thus, with respect to the RS-232 systems, we vacate summary judgment regarding Haas's liability for inducement of infringement and contributorily infringement of claims 1 and 7 and remand for further proceedings consistent with this opinion.

Finally, the only disputed claim language in claim 11 is the term "data block," which the district court construed incorrectly, as explained above. Because the district court granted summary judgment of noninfringement with respect to claim 11 based on an

Even though a floppy disk drive and a tape cassette transport are not literally the same structure, infringement by equivalent structure in patent law under § 112, ¶ 6 is considered to be literal infringement.

incorrect construction of the term "data block", we vacate the summary judgment of no literal infringement and noninfringement under the doctrine of equivalents with respect to claim 11.

#### C. Haas's Cross-Appeal

Because we vacate the district court's grant of summary judgment, we now address Haas's cross-appeal regarding claim construction. Haas contends that the district court erroneously construed the limitation that reads "indicator means for providing at an output digital signals indicative of the relative position between the tool and the workpiece." The district court correctly concluded that this claim limitation is subject to § 112, ¶ 6. The claimed function is providing output signals indicative of the relative position between the tool and the workpiece, and the corresponding structure in the written description is hardware circuitry—an encoder and an up/down counter as shown in Figure 4—for each axis of movement. The dispute between the parties centers on the meaning of the phrase "indicative of the relative position between the tool and the workpiece." Haas contends that a signal that outputs absolute position, measured with reference to a fixed point, cannot be a signal indicative of relative position within the meaning of the claims. The district court rejected Haas's proposed claim construction and held that an indicator that indirectly measures the distance between the tool and the workpiece by indicating the distance of each to a fixed point does indeed indicate the "relative position."

The written description supports the district court's construction. In the disclosed embodiment, the machine tool operator sets a "table zero" point by moving the table containing the workpiece to a desired location and pushing a button. At this point, the microprocessor software reads the digital outputs of the counters corresponding to the x and y axes and records those outputs as the zero reference point. The counter outputs themselves are arbitrary 8-bit words and are not physically reset to zero. Similarly, the operator can perform a "tool calibration" procedure by lowering the spindle to a desired zero reference point and pushing a button, at which point the microprocessor software saves the digital output of the z axis counter as a zero reference point. As the machine tool performs an operation, the encoders output "clicks" when they detect movement of the workpiece along the x and y axes and the tool along the z axis. The counters count the number of clicks in the

positive and negative directions and output a digital signal representing the number of clicks. At specified time intervals, the microprocessor calculates the actual positions of the tool and workpiece by comparing the counter outputs with those saved as the zero reference point.

The digital signal outputs of the counters are "indicative of the relative position between the tool and the workpiece" because they represent the distance and direction the tool and the workpiece have moved from a zero reference point and can therefore be used to determine the relative position between the tool and the workpiece. Thus, in light of the written description, "indicative of the relative position" simply means that the signals can be used to determine the relative position between the tool and the workpiece. Although it may be common for the operator to perform a "table zero" operation when the tool is directly above the workpiece, thus using the workpiece to establish a zero reference point, nothing about the digital signals from the counters directly reflects the position of the tool relative to the workpiece as Haas incorrectly states. Only when compared to the counter values read when the workpiece and tool were at the zero reference point can the counter outputs be used to determine a position, relative or otherwise. Similarly, signals representing the absolute positions of the tool and workpiece with respect to a fixed point, such as in the Haas system, are relevant only as compared to the fixed reference point. Nothing in the claims or written description precludes a signal that directly indicates the distance of the tool and workpiece from a fixed reference position from being a signal "indicative of the relative position between the tool and the workpiece."

We are not persuaded by Haas's argument that IMS surrendered coverage of absolute positioning systems during reexamination of the '754 patent when explaining the pertinency of several prior art references. While the patentee stated that the Eaton reference, U.S. Patent No. 3,821,525, discloses sensors indicating position and a Japanese Kokai reference discloses a position register storing absolute position, the patentee did not distinguish these structures from the structure disclosed in the '754 patent. Indeed, it is not clear in either reference that positions are measured with respect to a fixed point established by the machine tool, as in the Haas systems, rather than a fixed point established by the operator, as in the disclosed embodiment of the '754 patent. Both references distinguish "absolute" positioning from "incremental" or "point-to-point" positioning,

ated by Haas's argument  
and coverage of absolute  
during reexamination of  
Explaining the pertin-  
ence references. While  
the Eaton reference,  
discloses sensors  
Japanese Kokai  
register storing  
did not distin-  
the structure  
indeed it is not  
positions are  
point estab-  
the Haas  
established  
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tioning

Haas also appeals the district court's construction of the "feed rate adjust means" in claim 7. Although in its claim construction order the district court quoted language from claim 7 as originally issued instead of from the claim as amended in reexamination, the district court correctly construed this claim limitation. The claimed function of the "feed rate adjust means" is to allow the operator to adjust manually the feed rate independently of the control parameters in memory. The "recalculating" function is performed by the processor unit, not the "feed rate adjust means," and thus is not subject to construction in accordance with § 112, ¶ 6. Therefore, it is unnecessary to identify structure corresponding to the recalculation function or to discuss the method of recalculation. The term "recalculating," possesses its ordinary meaning.

## SUMMARY

We hold that the district court made several errors with respect to claim construction. First, under a proper claim construction, the "interface means" limitation in claims 1 and 7 should be construed to cover the corresponding structure disclosed in the written description, including a PIA and a tape cassette transport, and equivalents thereof in accordance with § 112, ¶ 6. Next, the proper construction of the term "data block" in claims 1 and 11 is a computer data structure containing the information needed by a machine tool to perform a single machining operation. As properly construed, a "data block" is not limited to the specific set of variables and display sequence disclosed in the written description and does not preclude the use of G- and M-codes. Finally, the use of the term "control apparatus" in claims 1 and 7 does not preclude infringement of those

In view of the proper claim construction, there are genuine issues of material fact as to whether a floppy disk drive is an equivalent of the disclosed tape cassette transport. Accordingly, we vacate the district court's grant of summary judgment of noninfringement of claims 1 and 7 with respect to the Haas systems containing floppy disk drives and remand for further proceedings consistent with this opinion.

Because the district court erred in its construction of the term "data block," we vacate the district court's summary judgment of noninfringement of claim 11 and remand for further proceedings consistent with this opinion.

**CONCLUSION**

## CONCLUSION

1991

**AFFIRMED-IN-PART, VACATED-IN-PART, AND REMANDED.**

## COSTS

Each party shall bear its own costs.

**U.S. Court of Appeals  
Federal Circuit**

Zodiac Pool Care Inc. v. Hoffinger Industries Inc.

Nos. 99-1224, -1233



response was due on March 27, 1979. Application 4 became abandoned because applicant did not respond to an office action dated March 27, 1979. Application 5 was due on June 27, 1979. Applicant became abandoned because applicant did not respond to an office action dated June 27, 1979. Application 6 was due on September 27, 1979. Applicant became abandoned because applicant did not respond to an office action dated September 27, 1979. Application 7 was due on December 27, 1979. Applicant became abandoned because applicant did not respond to an office action dated December 27, 1979. Application 8 was due on March 27, 1980. Applicant became abandoned because applicant did not respond to an office action dated March 27, 1980. Application 9 was due on June 27, 1980. Applicant became abandoned because applicant did not respond to an office action dated June 27, 1980. Application 10 was due on September 27, 1980. Applicant became abandoned because applicant did not respond to an office action dated September 27, 1980. Application 11 was due on December 27, 1980. Applicant became abandoned because applicant did not respond to an office action dated December 27, 1980. Application 12 was due on March 27, 1981. Applicant became abandoned because applicant did not respond to an office action dated March 27, 1981. Application 13 was due on June 27, 1981. Applicant became abandoned because applicant did not respond to an office action dated June 27, 1981. Application 14 was due on September 27, 1981. Applicant became abandoned because applicant did not respond to an office action dated September 27, 1981. Application 15 was due on December 27, 1981. Applicant became abandoned because applicant did not respond to an office action dated December 27, 1981. Application 16 was due on March 27, 1982. Applicant became abandoned because applicant did not respond to an office action dated March 27, 1982. Application 17 was due on June 27, 1982. Applicant became abandoned because applicant did not respond to an office action dated June 27, 1982. Application 18 was due on September 27, 1982. Applicant became abandoned because applicant did not respond to an office action dated September 27, 1982. Application 19 was due on December 27, 1982. Applicant became abandoned because applicant did not respond to an office action dated December 27, 1982. Application 20 was due on March 27, 1983. Applicant became abandoned because applicant did not respond to an office action dated March 27, 1983. Application 21 was due on June 27, 1983. Applicant became abandoned because applicant did not respond to an office action dated June 27, 1983. Application 22 was due on September 27, 1983. Applicant became abandoned because applicant did not respond to an office action dated September 27, 1983. Application 23 was due on December 27, 1983. Applicant became abandoned because applicant did not respond to an office action dated December 27, 1983. Application 24 was due on March 27, 1984. Applicant became abandoned because applicant did not respond to an office action dated March 27, 1984. Application 25 was due on June 27, 1984. Applicant became abandoned because applicant did not respond to an office action dated June 27, 1984. Application 26 was due on September 27, 1984. Applicant became abandoned because applicant did not respond to an office action dated September 27, 1984. Application 27 was due on December 27, 1984. Applicant became abandoned because applicant did not respond to an office action dated December 27, 1984. Application 28 was due on March 27, 1985. Applicant became abandoned because applicant did not respond to an office action dated March 27, 1985. Application 29 was due on June 27, 1985. Applicant became abandoned because applicant did not respond to an office action dated June 27, 1985. Application 30 was due on September 27, 1985. Applicant became abandoned because applicant did not respond to an office action dated September 27, 1985. Application 31 was due on December 27, 1985. Applicant became abandoned because applicant did not respond to an office action dated December 27, 1985. Application 32 was due on March 27, 1986. Applicant became abandoned because applicant did not respond to an office action dated March 27, 1986. Application 33 was due on June 27, 1986. Applicant became abandoned because applicant did not respond to an office action dated June 27, 1986. Application 34 was due on September 27, 1986. Applicant became abandoned because applicant did not respond to an office action dated September 27, 1986. Application 35 was due on December 27, 1986. Applicant became abandoned because applicant did not respond to an office action dated December 27, 1986. Application 36 was due on March 27, 1987. Applicant became abandoned because applicant did not respond to an office action dated March 27, 1987. Application 37 was due on June 27, 1987. Applicant became abandoned because applicant did not respond to an office action dated June 27, 1987. Application 38 was due on September 27, 1987. Applicant became abandoned because applicant did not respond to an office action dated September 27, 1987. Application 39 was due on December 27, 1987. Applicant became abandoned because applicant did not respond to an office action dated December 27, 1987. Application 40 was due on March 27, 1988. Applicant became abandoned because applicant did not respond to an office action dated March 27, 1988. Application 41 was due on June 27, 1988. Applicant became abandoned because applicant did not respond to an office action dated June 27, 1988. Application 42 was due on September 27, 1988. Applicant became abandoned because applicant did not respond to an office action dated September 27, 1988. Application 43 was due on December 27, 1988. Applicant became abandoned because applicant did not respond to an office action dated December 27, 1988. Application 44 was due on March 27, 1989. Applicant became abandoned because applicant did not respond to an office action dated March 27, 1989. Application 45 was due on June 27, 1989. Applicant became abandoned because applicant did not respond to an office action dated June 27, 1989. Application 46 was due on September 27, 1989. Applicant became abandoned because applicant did not respond to an office action dated September 27, 1989. Application 47 was due on December 27, 1989. Applicant became abandoned because applicant did not respond to an office action dated December 27, 1989. Application 48 was due on March 27, 1990. Applicant became abandoned because applicant did not respond to an office action dated March 27, 1990. Application 49 was due on June 27, 1990. Applicant became abandoned because applicant did not respond to an office action dated June 27, 1990. Application 50 was due on September 27, 1990. Applicant became abandoned because applicant did not respond to an office action dated September 27, 1990. Application 51 was due on December 27, 1990. Applicant became abandoned because applicant did not respond to an office action dated December 27, 1990. Application 52 was due on March 27, 1991. Applicant became abandoned because applicant did not respond to an office action dated March 27, 1991. Application 53 was due on June 27, 1991. Applicant became abandoned because applicant did not respond to an office action dated June 27, 1991. Application 54 was due on September 27, 1991. Applicant became abandoned because applicant did not respond to an office action dated September 27, 1991. Application 55 was due on December 27, 1991. Applicant became abandoned because applicant did not respond to an office action dated December 27, 1991. Application 56 was due on March 27, 1992. Applicant became abandoned because applicant did not respond to an office action dated March 27, 1992. Application 57 was due on June 27, 1992. Applicant became abandoned because applicant did not respond to an office action dated June 27, 1992. Application 58 was due on September 27, 1992. Applicant became abandoned because applicant did not respond to an office action dated September 27, 1992. Application 59 was due on December 27, 1992. Applicant became abandoned because applicant did not respond to an office action dated December 27, 1992. Application 60 was due on March 27, 1993. Applicant became abandoned because applicant did not respond to an office action dated March 27, 1993. Application 61 was due on June 27, 1993. Applicant became abandoned because applicant did not respond to an office action dated June 27, 1993. Application 62 was due on September 27, 1993. Applicant became abandoned because applicant did not respond to an office action dated September 27, 1993. Application 63 was due on December 27, 1993. Applicant became abandoned because applicant did not respond to an office action dated December 27, 1993. Application 64 was due on March 27, 1994. Applicant became abandoned because applicant did not respond to an office action dated March 27, 1994. Application 65 was due on June 27, 1994. Applicant became abandoned because applicant did not respond to an office action dated June 27, 1994. Application 66 was due on September 27, 1994. Applicant became abandoned because applicant did not respond to an office action dated September 27, 1994. Application 67 was due on December 27, 1994. Applicant became abandoned because applicant did not respond to an office action dated December 27, 1994. Application 68 was due on March 27, 1995. Applicant became abandoned because applicant did not respond to an office action dated March 27, 1995. Application 69 was due on June 27, 1995. Applicant became abandoned because applicant did not respond to an office action dated June 27, 1995. Application 70 was due on September 27, 1995. Applicant became abandoned because applicant did not respond to an office action dated September 27, 1995. Application 71 was due on December 27, 1995. Applicant became abandoned because applicant did not respond to an office action dated December 27, 1995. Application 72 was due on March 27, 1996. Applicant became abandoned because applicant did not respond to an office action dated March 27, 1996. Application 73 was due on June 27, 1996. Applicant became abandoned because applicant did not respond to an office action dated June 27, 1996. Application 74 was due on September 27, 1996. Applicant became abandoned because applicant did not respond to an office action dated September 27, 1996. Application 75 was due on December 27, 1996. Applicant became abandoned because applicant did not respond to an office action dated December 27, 1996. Application 76 was due on March 27, 1997. Applicant became abandoned because applicant did not respond to an office action dated March 27, 1997. Application 77 was due on June 27, 1997. Applicant became abandoned because applicant did not respond to an office action dated June 27, 1997. Application 78 was due on September 27, 1997. Applicant became abandoned because applicant did not respond to an office action dated September 27, 1997. Application 79 was due on December 27, 1997. Applicant became abandoned because applicant did not respond to an office action dated December 27, 1997. Application 80 was due on March 27, 1998. Applicant became abandoned because applicant did not respond to an office action dated March 27, 1998. Application 81 was due on June 27, 1998. Applicant became abandoned because applicant did not respond to an office action dated June 27, 1998. Application 82 was due on September 27, 1998. Applicant became abandoned because applicant did not respond to an office action dated September 27, 1998. Application 83 was due on December 27, 1998. Applicant became abandoned because applicant did not respond to an office action dated December 27, 1998. Application 84 was due on March 27, 1999. Applicant became abandoned because applicant did not respond to an office action dated March 27, 1999. Application 85 was due on June 27, 1999. Applicant became abandoned because applicant did not respond to an office action dated June 27, 1999. Application 86 was due on September 27, 1999. Applicant became abandoned because applicant did not respond to an office action dated September 27, 1999. Application 87 was due on December 27, 1999. Applicant became abandoned because applicant did not respond to an office action dated December 27, 1999. Application 88 was due on March 27, 2000. Applicant became abandoned because applicant did not respond to an office action dated March 27, 2000. Application 89 was due on June 27, 2000. Applicant became abandoned because applicant did not respond to an office action dated June 27, 2000. Application 90 was due on September 27, 2000. Applicant became abandoned because applicant did not respond to an office action dated September 27, 2000. Application 91 was due on December 27, 2000. Applicant became abandoned because applicant did not respond to an office action dated December 27, 2000. Application 92 was due on March 27, 2001. Applicant became abandoned because applicant did not respond to an office action dated March 27, 2001. Application 93 was due on June 27, 2001. Applicant became abandoned because applicant did not respond to an office action dated June 27, 2001. Application 94 was due on September 27, 2001. Applicant became abandoned because applicant did not respond to an office action dated September 27, 2001. Application 95 was due on December 27, 2001. Applicant became abandoned because applicant did not respond to an office action dated December 27, 2001. Application 96 was due on March 27, 2002. Applicant became abandoned because applicant did not respond to an office action dated March 27, 2002. Application 97 was due on June 27, 2002. Applicant became abandoned because applicant did not respond to an office action dated June 27, 2002. Application 98 was due on September 27, 2002. Applicant became abandoned because applicant did not respond to an office action dated September 27, 2002. Application 99 was due on December 27, 2002. Applicant became abandoned because applicant did not respond to an office action dated December 27, 2002. Application 100 was due on March 27, 2003. Applicant became abandoned because applicant did not respond to an office action dated March 27, 2003.

opinion as to his mental deterioration in recent years. However, his senility would not be inconsistent with my prior observations of him during those occasions when I was called upon to treat his heart problems.

Mr. Barlow stated that his law firm assumed the prosecution of a number of patent applications which were formerly handled by Schwartz. His testimony recounted three instances in which Schwartz had not filed completed United States patent applications which should have been filed, and nine instances in which Schwartz caused erroneously instructed foreign associates to drop the prosecution of corresponding foreign applications. Mr. Barlow stated that the foreign applications were filed "in the fall and early spring of 1978-79." He also stated that one of the three unfilled United States patent applications included a signed declaration dated September of 1979; no dates for the other two unfilled United States applications were noted.

[2] As evidenced above, Schwartz's course of professional failures subsequent to April 1973 was progressively worse. The failures began in early 1974 and became more frequent in the following years. Because Schwartz's state of health became precarious as early as April 1973, there is no reason to isolate the year 1974 and treat it differently from the later years. Accordingly, the initial abandonment of the '365 application was due at least in part to Schwartz's illness and thus excused within the meaning of unavoidable delay under 35 U.S.C. §133. See e.g. *In re Mattullah*, 1912 Dec. Comm'r Pat. 490, 493 (App. D.C. 1912); *Ex parte Sellers*, 1905 Dec. Comm'r Pat. 336 (Comm'r Pat. 1905); *McDuffee v. Hesstonville*, 181 F. 503, 510-11 (E.D. Pa. 1910).

### Conclusion

For the foregoing reasons and on this rather unusual set of facts, Leonardo has demonstrated unavoidable delay within the meaning of 35 U.S.C. §133, and the renewed petition under 37 CFR §1.137(a) to revive the '365 application from abandonment is granted.

U.S. Patent and Trademark Office  
Board of Patent Appeals and Interferences

Ex parte Levy

No. 90-1864

Decided October 16, 1990  
Released November 8, 1990

## PATENTS

### 1. Patentability/Validity — Anticipation — Identity of elements (§115.0704)

Factual determination of anticipation requires disclosure in single reference of every element of claimed invention, and examiner must identify wherein each and every facet of claimed invention is disclosed in applied reference.

### 2. Patentability/Validity — In general (§115.01)

#### Patentability/Validity — Anticipation — Prior art (§115.0703)

Initial burden of establishing prima facie basis to deny patentability rests upon examiner; examiner, if relying upon theory of inherency, must provide basis in fact and/or technical reasoning to reasonably support determination that allegedly inherent characteristic necessarily flows from teachings of applied prior art.

### 3. Patentability/Validity — Anticipation — Prior art (§115.0703)

Examiner erred by rejecting claims for biaxially oriented catheter balloon as anticipated by prior art which does not disclose such biaxially oriented balloon and which has not been shown to be inherently biaxially oriented.

### 4. Patentability/Validity — Obviousness — Relevant prior art — Particular inventions (§115.0903.03)

Examiner erred by rejecting claims for biaxially oriented balloon catheter under 35 USC 103 based upon combined disclosure of two prior art references; one of which was relied upon solely for disclosed use of high viscosity polyethylene terephthalate tubing and the other which was presupposed by examiner to disclose biaxially oriented catheter balloon, since examiner has not established that resulting catheter balloon using high viscosity tubing is biaxially oriented.

Application of Stanley B. Levy, serial no. 287,234, filed Dec. 21, 1988, which is a division of serial no. 914,108, filed Oct. 1, 1986, now Re. 32,983, granted July 4, 1989; and a reissue of serial no. 510,812, filed July 5, 1983, now patent no. 4,490,421, granted Dec. 25, 1984, for balloon and manufacture thereof. From examiner's rejection of claims 13 through 17 and 25 (James Seidleck, pri-

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6

tabbies

mary examiner), applicant appeals. Reversed.

Louis H. Rombach, Wilmington, Del., for appellant.

Before Steiner, Tarring, and J. Smith, examiners-in-chief.

Steiner, examiner-in-chief.

This is an appeal from the final rejection of claims 13 through 17 and 25, which are all of the claims remaining in this application for reissue of U.S. Patent No. 4,490,421<sup>1</sup>.

The subject matter on appeal is directed to a polymeric balloon exhibiting properties which enable its use as a catheter balloon for medical dilation procedures, such as coronary angioplasty wherein a catheter with a balloon at a distal end thereof is inserted into coronary arteries and inflated. The balloon must be capable of exerting sufficient pressure to dilate stenotic lesions without rupture of the balloon.

Claims 13 and 25, the only independent claims on appeal, read as follows:

13. *High molecular weight, biaxially oriented, flexible polymeric balloon having a wall tensile strength of at least 31,714 psi (218.86 MPa).*

25. *High molecular weight, biaxially oriented, flexible polyethylene terephthalate dilatation catheter balloon.*

The references relied upon by the examiner are:

Wyeth et al. (Wyeth)	3,733,309	May 15, 1973
Schjeldahl et al.		
(Schjeldahl '989)	4,413,989	Nov. 8, 1983
Schjeldahl et al.		
(Schjeldahl '000)	4,456,000	June 26, 1984

Claims 13, 14, 16, 17 and 25 stand rejected under 35 U.S.C. 102 as anticipated by Schjeldahl. Claims 13 through 17 stand rejected under 35 U.S.C. 103 based upon "Schjeldahl et al in view of Wyeth as set forth in the Final Rejection" (paragraph bridging pages 3 and 4 of the Answer). We reverse each rejection.

<sup>1</sup> Each of the Schjeldahl references contains essentially the same relevant disclosure. Accordingly, unless otherwise indicated, we have referred to these references collectively as "Schjeldahl," consistent with the approach adopted by both appellant and the examiner.

<sup>2</sup> See footnote 1.

*The Rejection of Claims 13, 14, 16, 17 and 25 Under 35 U.S.C. §102.*

[1] The factual determination of anticipation requires the disclosure in a single reference of every element of the claimed invention. *In re Spada*, \_\_\_ F.2d \_\_\_, 15 USPQ2d 1655 (Fed. Cir. 1990); *In re Bond*, \_\_\_ F.2d \_\_\_, 15 USPQ2d 1566 (Fed. Cir. 1990); *Diversitech Corp. v. Century Steps, Inc.*, 850 F.2d 675, 7 USPQ2d 1315 (Fed. Cir. 1988); *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 7 USPQ2d 1057 (Fed. Cir. 1988); *Alco Standard Corp. v. TVA*, 808 F.2d 1490, 1 USPQ2d 1337 (Fed. Cir. 1986); *In re Marshall*, 578 F.2d 301, 198 USPQ 344 (CCPA 1978); *In re Arkley*, 455 F.2d 586, 172 USPQ 524 (CCPA 1972). Moreover, it is incumbent upon the examiner to identify wherein each and every facet of the claimed invention is disclosed in the applied reference. *Lindemann Maschinenfabrik GmbH v. American Hoist and Derrick*, 730 F.2d 1452, 221 USPQ 481 (Fed. Cir. 1984).

Each of the independent claims on appeal defines a polymeric balloon which is "biaxially oriented." Ergo, in order to establish a *prima facie* basis to defeat the patentability of independent claims 13 and 25 under 35 U.S.C. §102, the examiner is obliged to point out where Schjeldahl discloses a *biaxially oriented* polymeric balloon. The tenor of the final rejection and Answer presupposes that Schjeldahl discloses a *biaxially oriented* polymeric balloon. See, for example, page 5 of the Final Rejection wherein the examiner states

[t]he reference clearly teaches a *biaxially oriented* balloon catheter, and states that it is made by injection blow molding.

See, also, page 5 of the Answer wherein the examiner states

[a]rguments that the references don't disclose a *biaxially oriented* PET (polyethylene terephthalate) balloon catheter is contrary to what is *clearly stated* in the references (emphasis supplied).

The examiner does not point to, and we do not find, any express disclosure in Schjeldahl of a *biaxially oriented* polymeric balloon.

It would appear that the relevant evolutions in Schjeldahl which may have led the examiner to his determination are:

(a) an expander<sup>3</sup> formed from a thin, flexible inelastic, high tensile strength, *biaxially oriented* synthetic plastic material

<sup>3</sup> Schjeldahl characterizes the catheter balloon as an expander.

*e Rejection of Claims 13, 14, 16, 17  
Under 35 U.S.C. §102.*

The factual determination of anticipation requires the disclosure in a single reference of every element of the claimed invention. *In re Spada*, \_\_\_ F.2d \_\_\_, 15 USPQ2d 1655 (Fed. Cir. 1990); *In re Bond*, \_\_\_ F.2d \_\_\_, 15 USPQ2d 1566 (Fed. Cir. 1990); *Diversitech Corp. v. Century Inc.*, 850 F.2d 675, 7 USPQ2d 1315 (Cir. 1988); *Constant v. Advanced Microservices, Inc.*, 848 F.2d 1560, 7 USPQ2d 1337 (Fed. Cir. 1988); *Alco Standard Corp. v. A*, 808 F.2d 1490, 1 USPQ2d 1337 (Fed. Cir. 1986); *In re Marshall*, 578 F.2d 98 USPQ 344 (CCPA 1978); *In re A*, 455 F.2d 586, 172 USPQ 524 (A 1972). Moreover, it is incumbent on the examiner to identify wherein each element of the claimed invention is disclosed in the applied reference. *Linde-Maschinenfabrik GmbH v. American and Derrick*, 730 F.2d 1452, 221 USPQ 481 (Fed. Cir. 1984).

of the independent claims on appeal is a polymeric balloon which is "biaxially oriented." Ergo, in order to establish a *prima facie* basis to defeat the patentability of the independent claims 13 and 25 under 35 U.S.C. §102, the examiner is obliged to point out where Schjeldahl discloses a "biaxially oriented" polymeric balloon. The tenor of the question and Answer presupposes that Schjeldahl discloses a biaxially oriented polymeric balloon. See, for example, page 5 of the Final Rejection wherein the examiner

reference clearly teaches a biaxially oriented balloon catheter, and states that the reference discloses a biaxially oriented balloon catheter made by injection blow molding.

Page 5 of the Answer wherein the examiner states that the references don't disclose a biaxially oriented PET (polyethylene terephthalate) balloon catheter is completely clearly stated in the references (emphasis supplied).

not point to, and we do not find in the disclosure in Schjeldahl a polymeric balloon. The relevant evolutions may have led the examiner to the conclusion that

from a thin, flexible, tubular member of strength, biaxially oriented synthetic plastic material

balloon

(column 2 of Schjeldahl '989, lines 63 through 65, emphasis supplied);

(b) The expander 30 is preferably formed from a suitable synthetic plastic material, such as *biaxially oriented* polypropylene, by an injection blow molding operation and, as such, is substantially inelastic in both the axial and radial directions and may, for example, have a finished wall thickness in the range of from 0.005 to 0.200 millimeters, 0.025 millimeters being typical (column 6 of Schjeldahl '989, lines 45 through 52, emphasis supplied);

(c) It has been found that an expander of the above-dimensional characteristics can withstand internal inflation pressure in excess of 7 atmospheres without fear of rupture (column 6 of Schjeldahl '989, lines 62 through 65);

(d) injection blow molding step used to form the expander 30 (column 8, lines 16 and 17);

(e) the expander 30 is formed from a *biaxially oriented* thin plastic material capable of withstanding relatively high internal pressures without rupture and without exceeding the elastic limit for the material itself (column 10 of Schjeldahl '989, lines 32 through 36, emphasis supplied);

(f) the expander 82 is preferably formed from a suitable synthetic plastic material such as *biaxially oriented polypropylene* or *biaxially oriented polyethylene terephthalate* by an injection molding operation and, as such, is substantially inelastic in both the axial and radial direction (column 12 of Schjeldahl '989, lines 22 through 37, emphasis supplied); and

(g) Apparatus as in claim 1 wherein said non-elastic expander member comprises a longitudinally extending thin, flexible, tubular element *formed from a biaxially oriented* synthetic plastic material surrounding said outer tubular member with opposed ends thereof secured to said outer tubular member at spaced apart locations proximate said distal end thereof (claim 8 of Schjeldahl '989, emphasis supplied).

These excerpts do not justify the determination that Schjeldahl discloses a biaxially oriented polymeric balloon.

According to Schjeldahl, the *starting material* is a biaxially oriented synthetic plastic material, such as polyethylene terephthalate. The *final article*, i.e., the expander or catheter balloon, is *not characterized as biaxially oriented*. Moreover, it would appear to be undisputed that the *only* method disclosed by Schjeldahl for transforming the biaxially oriented *starting* plastic into the *final* catheter balloon, i.e., injection blow molding, is

not capable of producing a biaxially oriented catheter balloon. In fact, it is *undisputed* that injection blow molding would *destroy* the biaxial orientation of the plastic starting material. We refer to the Belcher affidavits, Exhibits V, VI and VIII,<sup>4</sup> which factually set forth the differences between "injection blow molding" and "injection stretch blow molding," and support the conclusion that the "injection blow molding" process disclosed by Schjeldahl could not possibly produce a biaxially oriented polymeric balloon.<sup>5</sup>

Indeed, the examiner agrees with appellant's position that injection blow molding could *not* produce a biaxially oriented balloon. See, for example, page 5 of the Final Rejection wherein the examiner states:

[s]tatements that injection blow molding without stretching will not produce a biaxially oriented article are *true* ... (emphasis supplied).

The examiner goes on, in the same sentence, to state:

but since the reference produces a biaxially oriented article, clearly a stretching step must be used.

Again, on page 5 of the Answer, the examiner states:

Since Schjeldahl et al produces a biaxially oriented article it follows that a stretching step must be used in the injection blow molding process.

The inescapable facts are that Schjeldahl does not disclose a biaxially oriented catheter balloon and does not mention a stretching step.

[2] The examiner also relies upon the theory that Schjeldahl's catheter balloon is inherently biaxially oriented. On page 4 of the Answer, the examiner points out that inasmuch as the Patent and Trademark Office does not have the requisite laboratory equipment for testing, the burden shifts to appellant. However, the initial burden of establishing a *prima facie* basis to deny patentability to a claimed invention rests

<sup>4</sup> Unless otherwise indicated, all exhibits mentioned are the exhibits to appellant's Brief.

<sup>5</sup> We recognize that a high burden of proof is required to demonstrate the inoperability of a United States patent. *In re Weber*, 405 F.2d 1403, 160 USPQ 549 (CCPA 1969); *In re Michalek*, 162 F.2d 229, 74 USPQ 107 (CCPA 1947). However, as noted above, Schjeldahl does not disclose a catheter balloon made of a biaxially oriented plastic. Therefore, appellant's evidence is not an attack on the operability of Schjeldahl, but quite relevant to the issue of inherency, i.e., whether the catheter balloon disclosed by Schjeldahl is inherently biaxially oriented.

upon the examiner. *In re Piasecki*, 745 F.2d 1468, 223 USPQ 785 (Fed. Cir. 1984). In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art. *In re King*, 801 F.2d 1324, 231 USPQ 136 (Fed. Cir. 1986); *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983); *In re Oelrich*, 666 F.2d 578, 212 USPQ 323 (CCPA 1981); *In re Wilding*, 535 F.2d 631, 190 USPQ 59 (CCPA 1976); *Hansgirc v. Kemmer*, 102 F.2d 212, 40 USPQ 665 (CCPA 1939). In our opinion, the examiner has not discharged that initial burden.

Schjeldahl does not provide any working example revealing the process conditions employed to produce the catheter balloon. We have only a general invitation to employ "injection-blow molding." As previously discussed, it is undisputed that injection blow molding would not have produced a biaxially oriented balloon and would have destroyed the biaxially orientation of a polymeric starting material.

Schjeldahl does not disclose any particular tensile strength of the catheter balloon. We do not find sufficient factual basis or cogent scientific reasoning to support the conclusion that Schjeldahl's disclosure with respect to the ability of the catheter balloon to "withstand an internal inflation pressure in excess of 7 atmospheres without fear of rupture" (column 6 of Schjeldahl '989, lines 63 through 65) necessarily means that the catheter balloon is biaxially oriented. According to the membrane equation calculations reported in Levy's declaration (Exhibit IV), Schjeldahl's balloon could not possibly exhibit the tensile characteristics of a biaxially oriented balloon. Levy's calculations are inconsistent with those of Pinchuk (Exhibit III). Suffice it to say, the conflicting calculations taint the factual determination of inherency with impermissible conjecture. Indeed, the examiner, in the paragraph bridging pages 4 and 5 of the Answer, states that

the membrane equation used to determine the tensil [sic, tensile] strength can be manipulated to produce any desired value, and thus is misleading.

Nevertheless, the examiner goes on to favor Pinchuk's calculations by stating in that same paragraph that

[c]ertainly use of the typically used wall thickness disclosed in Schjeldahl et al with the average radius, as done in the Pinchuk Declaration would be reasonable.

As noted above, the conflicting results obtained by applying the membrane equation, and the examiner's acknowledgment that that equation "can be manipulated to produce any desired value," underscore the speculative nature upon which the determination of inherency rests.

We do not find sufficient cogent technical reasoning and/or objective evidence to support the conclusion that Schjeldahl's characterization of the catheter balloon as inelastic in the axial and radial direction necessarily means that the catheter balloon is biaxially oriented. The characteristic "inelastic," as employed by Schjeldahl, apparently means that the catheter balloon will expand to a preformed diameter to enable precise measurement of the pressures exerted on the inner wall of the artery during the dilation procedure (column 4 of Schjeldahl '989, lines 12 through 17).

[3] In summary, Schjeldahl does not disclose a biaxially oriented catheter balloon. We do not find a sufficient basis to support the determination that Schjeldahl's balloon is inherently (necessarily) biaxially oriented. *In re King*, *supra*; *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, *supra*; *In re Oelrich*, *supra*; *In re Wilding*, *supra*; *Hansgirc v. Kemmer*, *supra*. Accordingly, the examiner's rejection of claims 13, 14, 16, 17 and 25, under 35 U.S.C. §102 as anticipated by Schjeldahl is reversed.<sup>6</sup>

#### *The Rejection of Claims 13 through 17 under 35 U.S.C. §103 Based upon the Combined Disclosures of Schjeldahl and Wyeth.*

Wyeth is directed to producing high strength biaxially oriented polyethylene terephthalate beverage containers. The disclosed method involves stretching polyethylene terephthalate having a relatively high inherent viscosity, e.g., at least about 0.85.

<sup>6</sup> There is evidence of record that Dupont, the assignee of the application, furnished biaxially oriented polyethylene terephthalate to Schjeldahl when he informed Dupont personnel that he required a thin, high strength polymeric film having a tensile strength in the range of 20,000-40,000 psi. See the Schjeldahl affidavit (Exhibit VIII) and the Dengler declaration executed on May 21, 1988 and appended to the protest submitted in parent application Serial No. 914,108. Such facts are not inconsistent with our determination that Schjeldahl does not disclose a biaxially oriented polyethylene terephthalate catheter balloon. The Rydell affidavit appended to the protest in the parent application does not persuade us that Schjeldahl expressly or inherently discloses a biaxially oriented polymeric catheter balloon. See Belcher's affidavit (Exhibit VI).



17 USPQ2d

It is apparent from the Final Rejection and Answer that the examiner's rejection of the appealed claims under 35 U.S.C. 103 is not predicated upon the theory that one having ordinary skill in the art would have been led to employ Wyeth's technique to produce a biaxially oriented balloon for use in Schjeldahl's catheter. Instead, the examiner presupposes that Schjeldahl discloses a biaxially oriented catheter balloon. The examiner relies upon Wyeth *solely* for the disclosed use of high viscosity polyethylene terephthalate tubing. We refer to page 6 of the Answer, first complete paragraph, wherein the examiner explains the rejection by stating:

Wyeth et al is not being combined with Schjeldahl et al, but merely shows the claimed high viscosity PET (polyethylene terephthalate) and supports the examiners [sic, examiner's] inherency arguments.<sup>7</sup>

The examiner is not substituting the process of Wyeth et al into Schjeldahl et al since both disclose the same process.<sup>8</sup> Arguments that Wyeth et al can't be scaled down are irrelevant since the examiner is not seeking to scale down that reference to produce the claimed article.

[4] We have already concluded that the examiner factually erred in determining that Schjeldahl expressly or inherently discloses a biaxially oriented catheter balloon. Assuming, *arguendo*, the examiner correctly concluded that one having ordinary skill in the art would have been led to employ a high viscosity polyethylene terephthalate tubing in producing Schjeldahl's catheter balloon, the rejection under 35 U.S.C. §103 must fall because the examiner has not established that the resulting catheter balloon is biaxially oriented. *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 5 USPQ2d 1434 (Fed. Cir. 1988).

Inasmuch as the examiner's rejection under 35 U.S.C. §103 is not predicated upon the theory that one having ordinary skill in the art would have been led to employ a conventional stretch blow molding technique, such as that disclosed by Wyeth, to

produce Schjeldahl's catheter balloon, the motivation for such a combination is an issue which was not crystallized on appeal and was not confronted by appellant. However, in view of the examiner's gratuitous statement in the paragraph bridging pages 5 and 6 of the Answer,<sup>9</sup> we are constrained to address that issue.

There appears to be no dispute that one having ordinary skill in the art would have recognized the desirability of producing a biaxially oriented balloon for use in Schjeldahl's catheter, since biaxially oriented materials were known to exhibit high tensile strengths. The thrust of the evidence relied upon by the examiner is that one having ordinary skill in the art would have simply resorted to a conventional stretch molding technique to produce a biaxially oriented balloon for use in Schjeldahl's catheter, specifically, *the technique employed by Wyeth to produce a beverage container*. See paragraph 4 of the Rydell affidavit executed April 25, 1988 and offered in support of the protest in parent application Serial No. 914,108, paragraph 5 of the Pinchuk affidavit (Exhibit III), and paragraphs 4 and 5 of the Kaufman affidavit (Exhibit XII). Interestingly enough, *Wyeth disagrees*. See page 5 of Wyeth's declaration (Exhibit XI). Wyeth points out various differences between the PET bottles produced by his disclosed process and the requirements of a catheter balloon, and then concludes that his process could *not* be used to produce a catheter balloon of the type disclosed by Levy.

We are persuaded by Belcher's affidavits and Wyeth's declaration, notwithstanding the affidavits of Rydell, Pinchuk and Kaufman,<sup>10</sup> that the known processes for produc-

<sup>7</sup> The noted statement provides:

Certainly in the least there was an *invitation* to make a biaxially oriented catheter balloon at the time of the Schjeldahl et al invention. Additionally injection stretch blow molding to produce biaxially oriented articles was well known at the time of the Schjeldahl et al invention (emphasis supplied).

<sup>10</sup> We agree with appellant that the credentials of Belcher and Wyeth in the relevant art appear more impressive than those of protestor's experts. According to the affidavit appearing as Appendix V, Belcher authored the chapter called "Blow Molding of Polymers" for the fifth edition of the Plastic Engineering Handbook of the Society of Plastics Industry. In addition, Belcher authored two chapters, one on "injection blow molding" and one on "stretch blow molding" for the Blow Molding Handbook of the Society of Plastics and Engineers. We consider Wyeth's opinion with respect to the capabilities of his own invention entitled to greater weight than the opinions of Rydell, Pinchuk and Kaufman.

<sup>8</sup> Actually, according to the Final Rejection which is incorporated in the Answer,

[i]t is the Examiner's position that it would be *prima facie* obvious to use the high viscosity polyethylene terephthalate of Wyeth in Schjeldahl et al to produce the claimed product (page 4, the only complete paragraph).

<sup>9</sup> It is apparent from our reversal of the examiner's rejection under 35 U.S.C. §102 that, in our opinion, Schjeldahl discloses neither a biaxially oriented catheter balloon nor a molding process which involves stretching.



ing biaxially oriented beverage containers, such as that disclosed by Wyeth, could not have been simply scaled down to produce a biaxially oriented catheter balloon for use in medical dilation procedures without the exercise of inventive skill." Based upon the record before us, it would appear unrealistic to conclude that one having ordinary skill in the art would have been led to employ Wyeth's technique, which is designed to produce beverage containers, to produce Schjeldahl's catheter balloon, motivated by a *reasonable expectation* of obtaining a *biaxially oriented* polymeric catheter balloon. *In re O'Farrell*, 853 F.2d 894, 7 USPQ2d 1673 (Fed. Cir. 1988). The rejection under 35 U.S.C. §103 is also reversed.

**REVERSED.**

**U.S. Patent and Trademark Office  
Trademark Trial and Appeal Board**

The Ritz Hotel Limited v. Ritz Closet Seat Corp.

Opposition No. 78,707

Decided September 24, 1990

**TRADEMARKS AND UNFAIR TRADE PRACTICES**

**1. Practice and procedure in Patent and Trademark Office — Interpartes proceedings — Standing (§325.0303)**

**Practice and procedure in Patent and Trademark Office — Interpartes proceedings — Opposition and cancellation — Rules and rules practice (§325.0305.05)**

Opposer may, on rebuttal, introduce facts and witnesses appropriate to deny, explain,

" We find it somewhat unrealistic in light of the apparent disparities in size and function, Belcher's affidavits and Wyeth's declaration, that Pinchuk and Kaufman equate beverage bottles to catheter balloons. See paragraph 10 of the Pinchuk affidavit (Exhibit III), wherein it is stated

[a]s a blow molded polymeric article, a bottle and a catheter balloon are equivalent.

See, also, paragraph 4 of the Kaufman affidavit (Exhibit XII), wherein it is stated that

anyone with ordinary skill in the plastics art would know how to make a biaxially oriented PET balloon; it would be similar to making a biaxially oriented PET bottle because both catheter balloons and bottles are equivalent structures — they are both fluid containers.

or otherwise discredit applicant's facts and witnesses, but testimony of opposer's witnesses that was directed toward applicant's testimony regarding damage should have been introduced, if at all, as part of opposer's case-in-chief, since damage issue has relevance only to opposer's standing to be heard; since applicant's testimony has not challenged opposer's standing, testimony given by opposer's witnesses during rebuttal period is improper.

**2. Acquisition, assignment, and maintenance of marks — Scope of trademark — Expansion of goods/territory (§305.0206)**

Trademark owner possesses rights in mark sufficient to preclude subsequent user's registration of same or substantially similar mark not only for like or similar goods, but for any goods which might reasonably be expected to emanate from it in normal expansion or extension of its business; personal luxury items are clearly within natural scope of expansion of opposer's business, which is providing hotel services under mark "Ritz," but toilet seats are not within such natural expansion of business.

**3. Infringement; conflicts between marks — Likelihood of confusion — Relatedness of goods or services — Not similar (§335.0305.05)**

Applicant's toilet seats, sold under mark "Rit-Z," are not likely to be attributed to opposer, which provides hotel services and sells luxury items under mark "Ritz."

**4. Registration and its effects — Non-registrable subject matter — Immoral, deceptive, scandalous (§315.0403)**

Opposer, in order to succeed on claim under Trademark Act's Section 2(a), must demonstrate that applicant's mark is same as, or close approximation of, opposer's name or identity, that applicant's mark would be recognized as such, that opposer is not connected with applicant's activities under its mark, and that opposer's name or identity is of sufficient fame or reputation that when applicant's mark is used on its goods, connection to opposer would be presumed; opposer which has failed to show connection of applicant's mark "Rit-Z," for toilet seats, with its hotel services and goods under mark "Ritz" has failed to prove that applicant's use of its mark points uniquely to opposer and thus has failed to set forth claim under Section 2(a).

that Athy suggests that the receivers "may be spaced on either side of the transmitter" and also that a receiver may be used, a logical interpretation of the suggestion to use greater number of receivers than two is that either one or two receivers are disposed on opposite sides of the transmitter from the two provided systems specifically described. The disclosure certainly does not provide a clear teaching of using a third receiver in the position required by the claims nor does it teach the spacing required thereby.

The solicitor, going into more detail than the examiner and board, urges Athy's suggestion of using a greater number of receivers than two would lead to modification of the patent. One transmitter-two receiver system by the addition of a third receiver for the purpose of making two simultaneous receiver-to-receiver measurements because "It is known that receiver-to-receiver measurements are most accurate \* \* \*." However, no disclosure to the latter effect has pointed out in the references.<sup>3</sup>

Quotation from Athy regarding the transmitter and receiver. Out hereinabove, suggests that the transmitter closer to the receiver than the distance between the two receivers permits obtaining information regarding variations in structure near the transmitter through the transmitter-to-receiver measurements while the longer receiver measurements represent characteristics of undisturbed or "flat" data. That disclosure teaches that the shorter spacing between the transmitter and receiver can obtain information as to disturbance near the bore hole. It relates to detecting thin earth layers or suggest modification of the transmitter-two receiver system to measure a first long receiver-to-receiver interval and a second receiver interval shorter than

The examiner apparently bases his decision on the fact that it is known that the receiver measurements are the same on certain material in which he considers an element of that proposition. The material, which states that a pair of receivers in connection with a transmitter to provide a receiver measurement over inaccuracies in systems utilizing transmitter-to-receiver measurements, satisfy us that appellants' broad proposition the

the thinnest rock formation to be located.

Wyckoff was cited primarily for its disclosure that the spacing between the detectors and source is varied depending upon the terrain and the ability to separate adjacent strata together with the reference to a separation of two to fifty feet. There is no suggestion there, however, that two intervals of different spacing be measured in connection with a single traverse of a bore hole, much less that both measurements be of receiver-to-receiver intervals.

[1] In summary, we think the examiner and board erred in finding the appealed claims obvious over the teachings of Athy and Wyckoff. The rejection is based on an improper piecemeal reconstruction of the prior art made in light of appellants' disclosure and not taught or made obvious by the reference disclosures. See In re Rothermel, 47 CCPA 866, 276 F.2d 393, 125 USPQ 328.

The decision of the board is reversed.

53 CCPA 1375

### Court of Customs and Patent Appeals

In re SPORMANN AND HEINKE

Appl. No. 7599 Decided July 21, 1966

### PATENTS

#### 1. Evidence — Judicial notice (§ 36.20)

##### Pleading and practice in Patent Office—Rejections (§ 54.7)

Although Board apparently took judicial notice of "spray drying" and although court has heard of spray drying, it is not a technique of which court would feel free to take judicial notice; if Patent Office wishes to rely on what "those familiar with spray drying would know," it must produce some reference showing what such knowledge consists of.

#### 2. Patentability — Invention — In general (§ 51.501)

Inherency of an advantage and its obviousness are different questions; that which may be inherent is not necessarily known; obviousness cannot be predicated on what is unknown.

#### 3. Construction of specification and claims — By specification and drawings — In general (§ 22.251)

Claims must be interpreted in light of specification.

Particular patents—Alkali Sulfites  
Spormann and Heinke, Production of Solid Alkali Sulfites, claims 7 and 8 of application allowed.

Appeal from Board of Appeals of the Patent Office.

Application for patent of Walter Spormann and Joachim Heinke, Serial No. 56,353, filed Sept. 16, 1960; Patent Office Group 110. From decision rejecting claims 7 and 8, applicants appeal. Reversed.

HERBERT B. KEIL and MATTHEW C. THOMPSON, both of Chicago, Ill., for appellants.

CLARENCE W. MOORE (GEORGE C. ROEMING of counsel) for Commissioner of Patents.

Before RICH, Acting Chief Judge, MARTIN, SMITH, and ALMOND, Associate Judges, and KIRKPATRICK, Judge.\*

RICH, Acting Chief Judge.

This appeal is from the unanimous decision of the Patent Office Board of Appeals,<sup>1</sup> petition for reconsideration denied, affirming the examiner's rejection of process claims 7 and 8 in application serial No. 56,353, filed September 16, 1960, for "Production of Solid Alkali Sulfites." No claim has been allowed.

In essence, the invention is a process of producing alkali metal sulfites from alkali metal hydroxides and/or carbonates by spraying the latter, in aqueous solution, into a dry gas containing sulfur dioxide, the temperature and humidity of the gas being such as to immediately vaporize the water to the end that very little sulfate is produced. The sulfate results from oxidation of the sulfite but this apparently does not occur to any great extent if the sulfite is dry immediately upon its production. Sulfate is particularly likely to form when the treating gas contains a large amount of oxygen as do waste gases which it is desired to use for economic reasons.

Claim 7 reads (breakdown ours):

7. A process for the production of

\* United States Senior Judge for the Eastern District of Pennsylvania, designated to participate in place of Chief Judge Worley, pursuant to provisions of Section 294(d), Title 28, United States Code.

<sup>1</sup> Consisting of Examiner-in-Chief Duncombe and Acting Examiners-in-Chief Behrens and Wyman, the latter writing the opinion.

EXHIBIT

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tables

solid alkali metal sulfite which comprises:

passing a finely dispersed aqueous solution of an alkali metal compound selected from the group consisting of sodium hydroxide, sodium carbonate, sodium bicarbonate, potassium hydroxide, potassium carbonate, potassium bicarbonate and mixtures thereof,

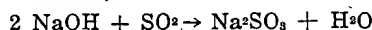
into a substantially dry gas containing sulfur dioxide,

maintaining the temperature of said dry gas at a level such that the water introduced with the solution and formed by the reaction of the alkali metal and the sulfur dioxide is immediately vaporized,

and thereafter separating from the gas the solid alkali metal sulfite which is formed by the reaction of the sulfur dioxide and the alkali metal compound.

Claim 8 differs from claim 7 in two respects. (1) The finely dispersed solution of alkali metal compound is passed "into an upwardly directed stream" of the dry gas containing sulfur dioxide and (2) the temperature of the dry gas is maintained "between about 20 and about 150°C."

A typical reaction, producing sodium sulfite from sodium hydroxide and sulfur dioxide, is



According to appellants' brief (emphasis ours):

It has long been known, of course, that sulfur dioxide ( $\text{SO}_2$ ) can be reacted with alkali metal hydroxides or carbonates to produce sodium sulfite. Ordinarily, a solution of sodium hydroxide or the like is interacted with  $\text{SO}_2$  gas. *There is one major drawback to the use of the known processes. The formed sulfite tends to oxidize, especially in the presence of heavy metal ions. Sodium sulfite, for example, oxidizes to form sodium sulfate ( $\text{Na}_2\text{SO}_4$ ). To prevent oxidation of the sulfite it was considered necessary to exclude atmospheric oxygen by using a concentrated sulfur dioxide gas containing relatively minor amounts of free oxygen or by carrying out the reaction between the sulfur dioxide and the alkali metal hydroxide in an inert atmosphere. The need for concentrated  $\text{SO}_2$  gases made it impossible to use roaster or waste gases containing sulfur dioxide which are formed in great quantities during the production of sulfuric acid. The protective measure described above is*

difficult to carry out especially in a commercial process. It has also been suggested that the oxidation of alkali sulfite be suppressed by adding substances to the solutions which are capable of binding heavy metal ions. In such processes, however, the substances which are added to bind the metal ions become impurities which contaminate the alkali sulfite.

A method was found by appellant-applicants whereby alkali sulfite can be obtained from alkali hydroxide or alkali carbonate and sulfur dioxide *without the concurrent formation of substantial amounts of alkali sulfate.* The process is carried out successfully without the addition of materials which contaminate the sulfite. In the process, a finely dispersed aqueous solution of an alkali metal hydroxide or carbonate or bicarbonate is passed (sprayed) into a substantially dry gas containing sulfur dioxide. *The temperature and relative humidity of the gas are maintained at such levels that the water introduced with the solution and formed by the reaction of the alkali metal and the sulfur dioxide is immediately vaporized.* Thereafter, solid alkali metal sulfite is separated from the gas. *The sulfite is formed instantly in the dry form and no longer is exposed to the action of oxygen which is present in the gas.* In the subject process, unlike the prior art processes, it is possible to use waste gases as a source of  $\text{SO}_2$ , which gases contain large quantities of oxygen (as much as 50 parts of oxygen per part of  $\text{SO}_2$ ).

In the process, therefore, a finely divided liquid and a gas are passed into the reaction zone and *solid sodium sulfite particles and water vapor leave the reaction vessel.* The exact point wherein the transition from liquid to solid and vapor occurs is not precisely known. What is known is that the water must be vaporized in the reaction zone leaving only vapor and solid alkali metal sulfite.

Much of this discussion also appears in appellants' specification.

The examiner finally rejected the claims as unpatentable "over any of" the following patents:

- Haywood 2,210,405 Aug. 6, 1940
- Aydelotte et al. 1,982,241 Nov. 27, 1934
- Friedrich et al. 1,091,429 Mar. 24, 1914
- Strickler 1,023,179 Apr. 16, 1912

In his Answer, the examiner also said,

to carry out especially in a process. It has also been found that the oxidation of alkali sulfite can be suppressed by adding to the solutions which are used in the processes, however, the alkali sulfite which are added to bind the impurities become impurities themselves and contaminate the alkali sulfite. It was found by appellants that alkali sulfite can be obtained from alkali hydroxide or carbonate and sulfur dioxide by the concurrent formation of small amounts of alkali sulfite. The process is carried out without the addition of material to contaminate the sulfite. In the process, a finely dispersed solution of an alkali metal carbonate or bicarbonate (sprayed) into a subcooled gas containing sulfur dioxide. The temperature and relative humidity of the gas are maintained at levels that the water vapor in the solution and the reaction of the alkali metal carbonate with sulfur dioxide is minimized. Thereafter, solid alkali sulfite is separated from the solution. The sulfite is formed in a dry form and no water is added to the action of the sulfite present in the gas. In the process, unlike the prior art, it is possible to use a source of  $\text{SO}_2$  gas in large quantities such as 50 parts of  $\text{SO}_2$  per part of alkali ( $\text{SO}_2$ ). Therefore, a finely dispersed gas are passed through a zone and solid sulfite and water vapor are separated in a vessel. The exact transition from liquid to vapor occurs is not known. What is known is that the gas is vaporized in leaving only vapor and solid sulfite.

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aminer also said,

"Appellants' process is considered nothing more than the application of this teaching of Friedrich et al. to a spray process such as is described in Aydelotte et al. Such a combination does not meet the provisions for patentability set forth in 35 U.S.C. 103."

The board said: "As recognized by the examiner, the rejection on Strickler appears to be cumulative but we will sustain the rejection as being one on Friedrich et al. in view of Aydelotte et al. or Haywood."

Friedrich et al. disclose a process for making sodium sulfites wherein a raw material such as sodium hydroxide or sodium carbonate is passed in a solid, powdered form through a horizontal rotating drum having radial plates or helical screw threads which cause the solid raw material to be turned and transported through the vessel. Sulfur dioxide gas is passed in countercurrent flow through the material within the drum. The solid, crushed raw material contains "a definite quantity of chemically combined or hygroscopic water" throughout the entire process, the amount of which "is so calculated in each individual case, that the heat of the reaction occurring on the absorption of the sulfurous acid gas [ $\text{SO}_2$ ] will partially or completely evaporate the water, so that the finished product issuing from the apparatus will exhibit the required degree of moisture or dryness." The amount of moisture is apparently selected so that the final product will be free flowing yet dustless. The invention is described as an improvement over, and is contrasted with, the then known (1910) "wet" process by eliminating the equipment, power, and related expenses necessary for separation of product from solution.

Aydelotte et al. disclose a process for reducing the sodium hydroxide (caustic soda) content of solutions containing a mixture of sodium hydroxide and potassium hydroxide (caustic potash). The patentees' objective is to produce caustic soda-caustic potash solution mixtures of certain ratios which they use in making synthetic indigo, the sodium sulfite being a mere by-product. The mixture, in solution, is treated with waste gas containing sulfur dioxide, "either by bubbling the gas through the liquid, countercurrent spraying of the liquid into the gas, or other means until a test portion when evaporated to about 50° Bé., cooled to about 46°C. and filtered shows that the ratio of mixed caustic has been changed to 40% of caustic soda and 60% of caustic potash." The whole batch of solu-

tion is then evaporated to about 50° Bé. and cooled to 40°C. whereupon sodium sulfite precipitates and is separated by filtration or decantation. What remains is, of course, still a solution. According to the patentees, the "crude separated sodium sulfite, containing small amounts of potassium sulfite, occluded caustic, and other impurities may, for some purposes, be used without purification, or it may be partly purified by washing, depending on what purpose it is to be used for."

Haywood discloses a method for producing calcium sulfite, especially as filler for paper, whereby a suspension of milk of lime, contained in an "absorber" tank, is whipped up as a fine mist by an agitator into an overhead gas containing from 7% to 20%  $\text{SO}_2$ . The essentially water-insoluble calcium sulfite product falls back into the suspension. It is stated that the calcium sulfite suspension can then be pumped to a paper machine. Alternatively, the patent states:

If the material is to be shipped, it should first be dewatered to reduce it to a thick paste or a dry powder. However, if it is to be used near the source of manufacture in a watery suspension, it may be used directly \* \* \*

As to temperatures in the "absorber" where the reaction between liquid and gas occurs, the specification says:

This temperature under ordinary conditions will usually rise to about 70° C. If desired, the combustion gases [from a sulfur burner where  $\text{SO}_2$  is generated for the process] \* \* \* may be cooled to a certain extent by water introduced into the tower \* \* \*. This, however, is not essential and may be dispensed with, if desired. There is no objection to introducing the gases into the absorber at a temperature of between 400° and 550° C. [Emphasis ours.]

Strickler discloses a process for producing sodium sulfites, an object of which is to prevent the formation of sulfates through oxidation, which is appellants' principal object. However, in the Strickler process,  $\text{SO}_2$  gas is passed into a suspension of sodium carbonate in a saturated solution of sodium sulfite. A temperature of about 49°C. (120°F.) is disclosed.

Comparing appellants' process with the prior art, clearly the basic chemical reaction embodied in their process is old, as their specification acknowledges. Aydelotte et al. would also suggest to one skilled in the art bringing



about this reaction by countercurrent spraying of a liquid containing caustic soda into a gas containing sulfur dioxide. The issue therefore is: would it be obvious to one of ordinary skill in this art to conduct the old reaction by such spraying under *all* the conditions set out in the claims and obtain appellants' results, i.e., would the invention as a whole have been obvious?

The board said:

Taking cognizance of the fact that spray drying is an old expedient for obtaining a solute in dry form, we fail to see that it is unobvious to modify the method taught by Friedrich et al. so that a solution of sodium carbonate, for instance, is passed in fine droplet form through the gaseous current comprising sulfur dioxide instead of the finely powdered carbonate of Friedrich, et al., particularly as Aydelotte et al. and Haywood do show, at least, that it is old to spray an alkaline hydroxide or carbonate solution through sulfur dioxide gas to obtain the corresponding sulfite.

Both appellants and Friedrich et al. obtain a dry sulfite and in such a simultaneous drying and chemical reaction process it is thought to be a mere difference in degree whether the water is present in such an amount as to dissolve the carbonate or is merely present as adhering water (Friedrich et al., page 2, lines 42 to 49). We note that Friedrich et al. only require that a sufficient amount of water be present to permit the chemical reaction to take place. Those familiar with spray drying know that dry products can be obtained even though a large amount of water may be present with the material to be dried.

Appellant urges that his product does not have much sulfate as a contaminant. *Though not mentioned by Friedrich et al.*, this seems to be merely an additional characteristic inherent in their process. In re Arnold et al., 50 CCPA 1166, 1963 C.D. 400, 794 O.G. 502, 315 F.2d 951, 137 USPQ 330. [Emphasis ours.]

[1] The board's reference to "spray drying" appears to have been injected as something of which it was taking judicial notice, without having been mentioned in any reference of record. While Aydelotte et al. and Haywood both disclose spraying of some sort, neither spray dries. While we have heard of spray drying, it is not a technique of which we would feel free to take judicial notice. We are of the

opinion that if the Patent Office wishes to rely on what "Those familiar with spray drying would know," it must produce some reference showing what such knowledge consists of. So far as we can see, appellants do spray and their sprayed solution is dried. We are unable to find, however, any indication in the references that such a step would have the effect which appellants sought and found, namely, a reduction of the undesirable oxidation of sulfite to sulfate in an old reaction tending to produce sulfate when the reactant gas contained large amounts of oxygen.

[2] The board apparently thought that the minimizing of sulfate production would be *inherent* in the process of Friedrich et al. However, this is no support for a rejection for various reasons. Friedrich et al. make no mention of it, as the board conceded. Their process is not appellants' process. It is a reaction between solid, powdered material and gas, the only water present being chemically combined water and hygroscopic water; appellants react sprayed solution and gas. As we pointed out in In re Adams, 53 CCPA 996, 356 F.2d 998, 148 USPQ 742, the inherency of an advantage and its obviousness are entirely different questions. That which may be inherent is not necessarily known. Obviousness cannot be predicated on what is unknown.

The result of appellants' process is said to be a product low in sulfate content, notwithstanding the use of waste gas containing relatively large amounts of oxygen, an asserted advantage not challenged by the Patent Office. So far as the disclosures of the references are concerned, we have found nothing to suggest it.

Strickler appears to be the only reference which deals with the problem of preventing the formation of sulfate during sulfite production but appears to solve the problem only by avoiding its cause. Sulfur dioxide gas is passed through a solution rather than waste gas containing oxygen and sulfur dioxide. Appellants' brief states, without refutation by the Patent Office, that "It is well known, of course, that this [Strickler] process would only be successful where atmospheric oxygen is excluded and where heavy metal ions are not present." The Patent Office treats this reference as "cumulative" and places little reliance on it.

The solicitor devotes most of his short brief to a discussion of Haywood's process which is different in several respects. The argument attempts to show how the claims can almost be

that if the Patent Office wishes to know what "Those familiar with drying would know," it must find some reference showing what knowledge consists of. So far as we see, appellants do spray and dry a solution is dried. We are to find, however, any indication of the effect which appellants have found, namely, a reduction in undesirable oxidation of sulfite in an old reaction tending to sulfate when the reactant gas is in large amounts of oxygen.

The board apparently thought minimizing of sulfate produced would be inherent in the process. *Rich et al.* However, this is no rejection for various reasons. *Rich et al.* make no mention of the board conceded. Their process is appellants' process. It is a process between solid, powdered materials, the only water present is initially combined water and water; appellants react with gas. As we pointed out in *Adams*, 53 CCPA 996, 356 USPQ 742, the inherency of the process and its obviousness are different questions. That the process is not necessarily obviousness cannot be predicated on it.

Appellants' process is to produce low in sulfate by using the use of a relatively large amount of water, an asserted advantage by the Patent Office. The disclosures of the process, we have found it.

It is to be the only reference with the problem of formation of sulfate in production but appears to be only by avoiding the use of oxide gas is passed rather than waste gas and sulfur dioxide. The Patent Office, that is, of course, that this would only be successful if atmospheric oxygen is present. The Patent Office has "cumulative" evidence on it.

Most of his discussion of Haywood is different in argument attempts to show that the claims can almost be

read on this reference, distinguishing only—but admittedly—in their references to the use of a "solution" and in naming the alkali metal reactants. Haywood is interested in producing calcium sulfite as a paper filler. It is not an alkali metal compound and therefore outside the claims. It is produced from a suspension, not a solution, of lime (CaO) or limestone (calcium carbonate, CaCO<sub>3</sub>) brought into contact with a gas containing SO<sub>2</sub>. No effort at all is made to dry the product or the gas. In fact, the conditions are such that as fast as the sulfite is formed it falls back into the suspension whence came the raw material. The gas treatment takes place in an "absorber" which is a vessel with liquid in the bottom having an agitator which revolves in the liquid and splashes it upwardly from its surface where it is contacted by the gas. Since the gas is exhausted through a stack the Patent Office would have us treat this as an "upwardly directed stream" within claim 8. We will not do so as this would distort the clear meaning of the claim when read in the light of the specification. Besides, gas flow in the absorbers is horizontal. Next, reliance is placed on Haywood's temperature disclosures. Here an obvious attempt is made to drag from its context something to meet claim limitations without regard to the true import of the claims. The argument is that if Haywood's gas is at 400° or 550°C., the gas would necessarily be dry gas and the water would necessarily vaporize immediately, as appellants' claims contemplate. But Haywood teaches that normally his gas will be about 70°C. This would not necessarily be dry, contrary to what is also contended, being below the boiling point of water. As to the higher temperatures mentioned, all that the patent says is that "There is no objection to introducing the gases into the absorber at a temperature of between 400° and 550°C." What effect this would have by way of vaporizing water is speculative and would depend on how much gas flows into the absorber how fast, how cold the suspension is, contact time between the mist thrown up by the agitator and the gas at whatever temperature it may have reached, heat loss from the absorber, etc. What goes on in the absorbers is a decidedly wet process having nothing to do with drying. What goes into them is aqueous suspension and that is also what comes out of them.

[3] Finally, the solicitor argues on the basis of Haywood's optional and later dehydration of his sulfite suspen-

sion to produce a shippable product that the immediate vaporizing and separation steps of the claims are met because it makes no difference that Haywood's supposedly dried particles fall back into liquid if ultimately they are again dried and separated. We think this is not taking the claims to mean what they say when interpreted as they must be, in the light of the specification. *Motion Picture Patents Co. v. Universal Film Mfg. Co.*, 243 U.S. 502. The solicitor's use of Haywood amounts to reading things into the reference that are not there and reading things out of the claims that are there. When this has been done, concededly the claims still do not read on Haywood and since this patent does not teach anything about immediate drying after reaction it does not make the invention obvious when added to Friedrich et al. who teach nothing about reacting solution with gas.

Our view is that one faced with the problem of how to use oxygen-containing waste gases in the production of alkali metal sulfites without undue production of sulfate would receive no suggestion from the references to spray a solution of the alkali metal compound into the gas stream under such conditions of temperature and relative humidity as to cause all water present to be immediately vaporized. This is the claimed invention and in our opinion its basic underlying concept is not to be found in the prior art of record.

The rejection of claims 7 and 8 is reversed.

#### Court of Claims of the United States

MINE SAFETY APPLIANCES COMPANY  
et al. v. UNITED STATES

No. 307-60 Decided July 15, 1966

#### PATENTS

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One having license under patent has complete defense to charge of infringement when patent or invention is used in accordance with license.

##### 2. Title — Licenses — Construction (§ 66.407)

Contract provision, in granting to Government a license to practice "each invention, improvement or discovery con-



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